The Farm

QUARTERLY

SUMMER 1949 • PRICE 60 CENTS

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TECHNOLOGY & SCIENCE

WILSON

Anticipated Your Freezer Needs!

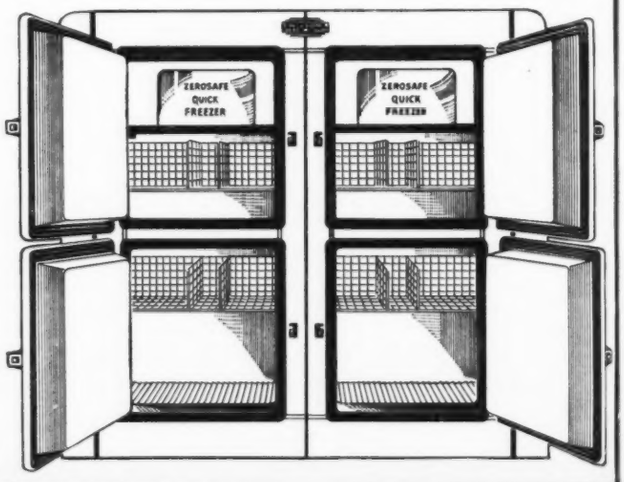
When you're just starting out you can start with a Zero°Safe sectional reach-in freezer to meet your needs.

As time goes on and you need more freezer capacity, you can add additional Wilson freezer sections. Each section can easily be made an integral part of the unit. Wilson Zero°Safe occupies the smallest amount of floor space per cubic foot of capacity.

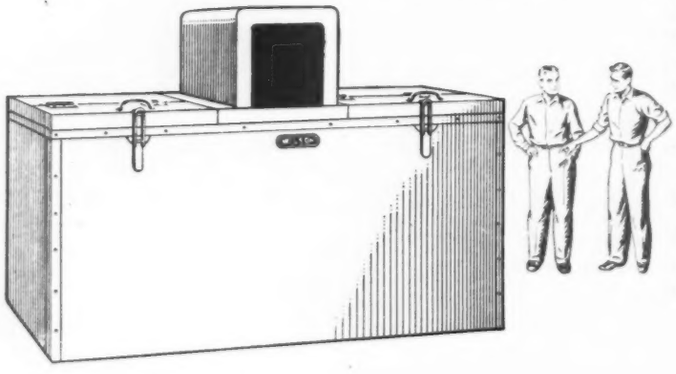
Now you can freeze and store all those *special foods in season* and enjoy them months later when time makes them a "*special treat.*"

ALL WILSON SECTIONAL REACH-IN FREEZERS . . .

. . . have big quick-freeze compartments.
. . . are upright and take up little space.
. . . have easy access storage shelves—permits quick handling of food.
. . . are insulated with 5¾" of Fiberglas.
. . . have front opening convenience which makes the food easy to reach.



The complete Wilson Family also includes Farm Milk Coolers



Wilson has a complete line of automatic high water level milk coolers. The Wilson Zero°Flow Milk Cooler provides twin-cooling—twin-storing compartments . . . it cools two milkings and stores both. And like all Wilson Refrigeration, the Zero°Flow Milk Cooler has low operating and maintenance costs . . . it has life tested construction . . . sanitation is easy . . . there are no gadgets to get out of order.

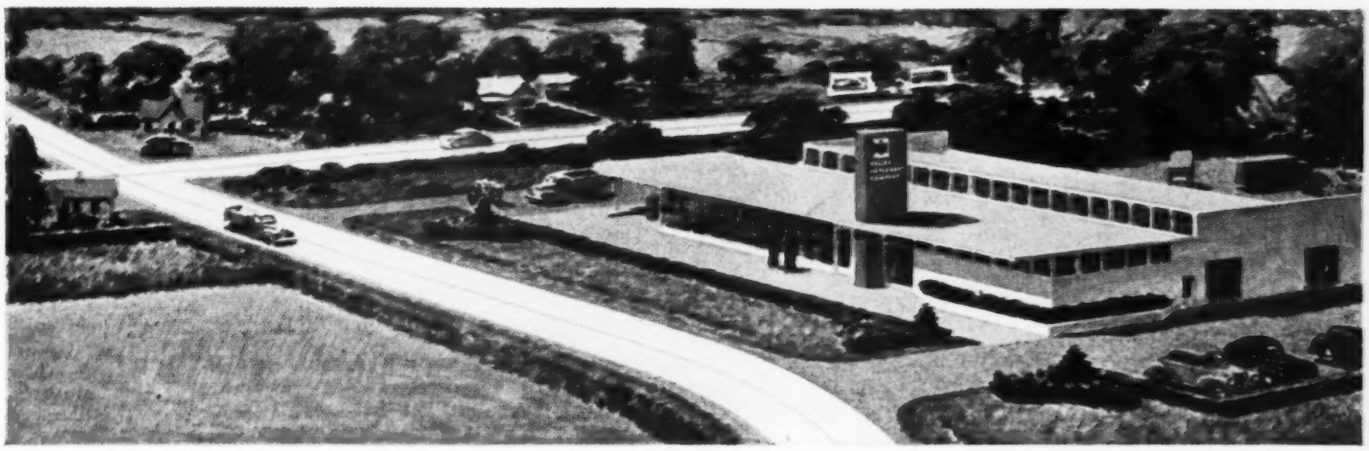
There is a Wilson Milk Cooler to fit your needs, including *new* front-opening models.

Why don't you? Join the many farm families who have looked them all over and then picked Wilson. When you buy Wilson you buy efficiency, economy, and durability.

WILSON REFRIGERATION, INC.
Division of Wilson Cabinet Co., Inc., Smyrna, Del.
Dealers everywhere or Write us Department S-FQ

WILSON REFRIGERATION

Farm Milk Coolers and Freezers



LANDMARK OF SERVICE—to the farms of America

WHEREVER YOU FARM, your International Harvester dealer's place of business is a friendly landmark you know well.

It's almost as familiar to you as your school or post office. And almost as much a part of your community.

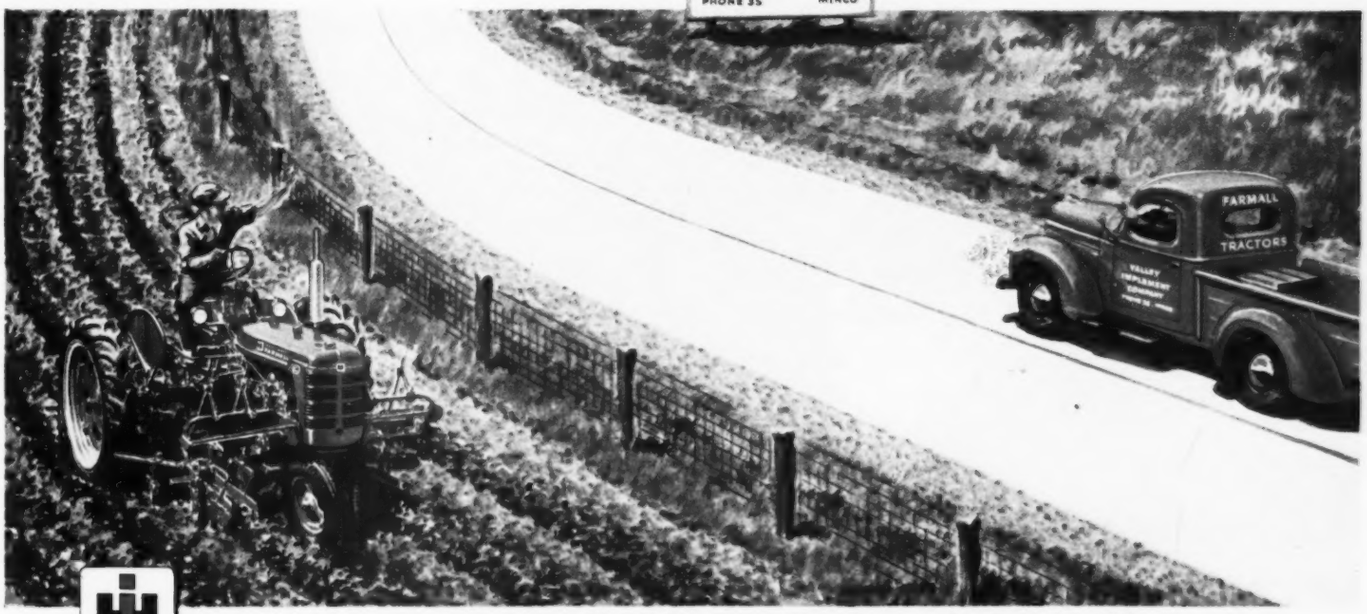
For it represents service. Service to you and your neighbors. Service brought to you by *one of your neighbors . . .*

You see, local service is an important part of your International Harvester dealer's customer relations. Your IH dealer not only brings you highly efficient Farmall tractors and McCormick equipment—he stands ready to see that they give you years of satisfactory, dependable use.

And when suddenly—in the rush of planting, cultivating, haying or harvesting—you need mechanical help or a spare part, you can depend on your International Harvester dealer. He has skilled men to serve you promptly. He has a large stock of precision-built parts on hand to hurry you back into waiting fields.

No wonder you wave a friendly greeting when your IH dealer drives by! He's the partner you depend on to help keep your operations moving. His store is your Landmark of Service.

INTERNATIONAL HARVESTER COMPANY • CHICAGO



Listen to James Melton on "Harvest of Stars" every Sunday afternoon over NBC

International Harvester Builds McCormick Farm Equipment . . . Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

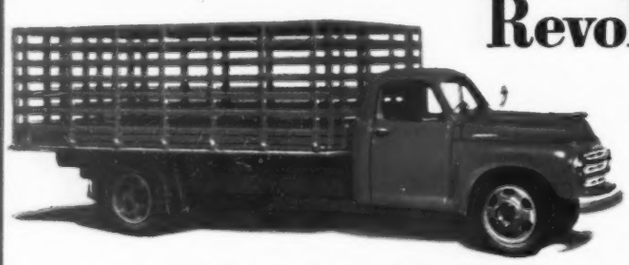
This modern building symbolizes the expanded service facilities of IH dealers throughout America.

INTERNATIONAL HARVESTER

1½-ton 12-foot platform stake—2-ton model also available

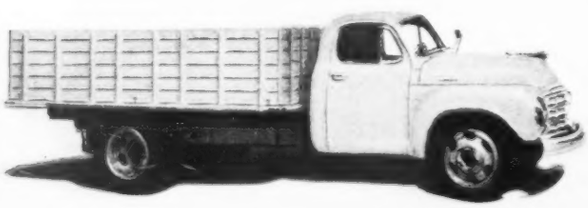
Revolutionary new Studebaker trucks cut farm hauling costs amazingly

They save gas — they save time — they stand up superbly!

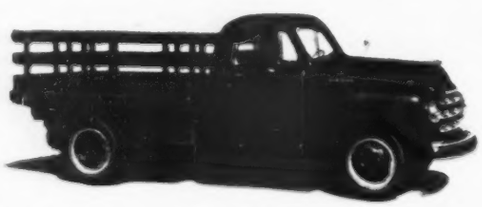


2-ton shown with 14-foot stock rack—1½-ton model also available

1½-ton 12-foot platform—2-ton model also available



1½-ton shown with 12-foot grain body—2-ton model also available



1-ton 8-foot platform stake—131" w.b. 9-foot stake also available

FARMERS who own new 1949 Studebaker trucks say they've never seen their equal. A Hebron, Indiana, man writes:

"My new 1949 Studebaker 1½ ton truck is tops. It's superior in performance to any truck I've owned previously—particularly in economy of operation. Its ability to pull a heavy payload in soft ground is greatly appreciated by any farmer."

Yes, whatever its size or wheelbase, every new 1949 Studebaker truck is a standout in low cost performance—in stand-up construction—in spine-saving, work-saving advancements.

You ride in a roomy, weather-tight, 3-man cab—with marvelous visibility—and head room, hip room and leg room to spare.

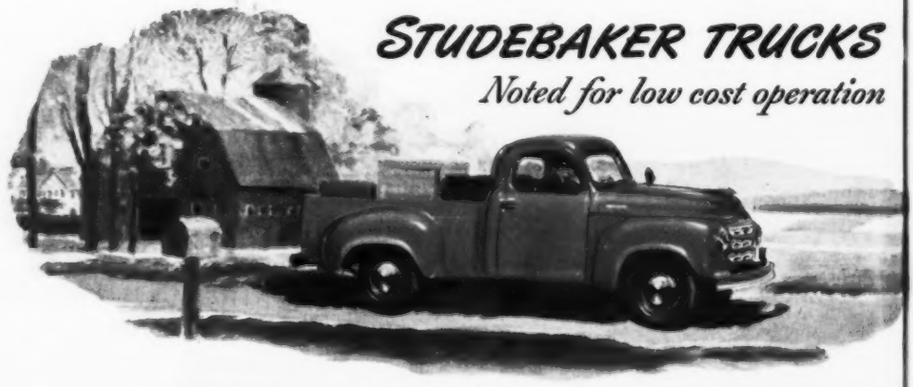
A low cab floor saves plenty of climbing. Steps are enclosed inside the doors. There's foot-controlled "air-scoop" floor ventilation—adjustable window wings, too. Studebaker's exclusive Truck Climatizer for heating and defrosting is available at added cost.

Unique variable ratio steering gives extra leverage for turn-arounds or parking. New "lift-the-hood" accessibility puts engine, ignition and wiring within easy arm's reach.

First chance you have, stop in at a Studebaker dealer's showroom and get first-hand information on these '49ers.

STUDEBAKER TRUCKS

Noted for low cost operation



½-ton, 6½-foot pick-up—also available are ¾-ton and 1-ton pick-ups in 8-foot body lengths

OF COURSE he can, and at any other farming operation. Why? — because Firestone Champions take a *full-traction* bite all-the-way across that massive, sturdy *full-traction* tread.

Just look at it. Notice how the higher, longer bars are curved and braced for extra bite and extra pull. No wonder they OUTpull all other tractor tires.

Underneath those rugged bars is a low-pressure tire body which runs on only 12 pounds pressure. This allows the entire tread bar surface to make full ground contact and deliver every ounce of extra traction that's built into it.

For additional proof, see your Firestone Dealer or Firestone Store.

Listen to the Voice of Firestone every Monday evening over NBC and Americana over NBC Network Television Stations

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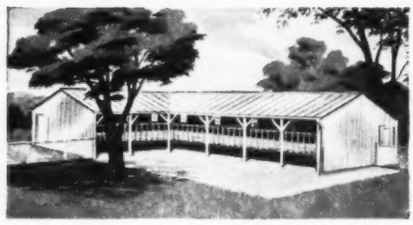
1. USE FIRESTONE CHAMPION TIRES
2. USE FIRESTONE HYDRO-FLATION
3. USE ONLY 12 LBS. PRESSURE

More ways to build better with REYNOLDS *Lifetime* ALUMINUM

Machinery Shed with Shop, 24′ x 60′. Build with aluminum and you'll have a cooler work place in summer, a building easier to keep warm in winter, because aluminum reflects heat from whatever direction it comes. Fire-resistant, lifetime protection for your valuable equipment.

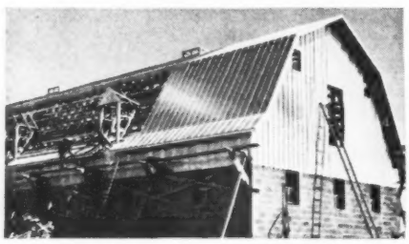
Portable Grain Bin. U. S. Dept. of Agriculture bulletin on grain storage says "high temperatures accelerate deterioration." Heat-reflecting aluminum can reduce summer temperatures, help prevent spoilage. Resists rats, termites—you can build your bins tight.



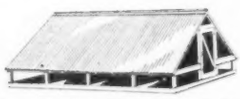
Cattle Shed. Note Reynolds *Lifetime* Aluminum Gutters and Downspouts . . . water collected here is pure and clean. Cattle are cooler under aluminum . . . give more milk, gain more weight. This roofing and siding stays bright, sound, modern-looking without maintenance. Capacity, 40 to 50 head.

Gable-type Brooder House. Univ. of Maryland tests with just aluminum-covered roofs show inside summer temperatures up to 6° cooler *at bird level.* Note skids . . . aluminum's light weight makes it easy to move. Size shown 12′ x 10′, capacity 300 chicks.

Hog House. Farmers report that where hogs and sheep have a choice between shelters of aluminum and of other materials, they crowd in under the aluminum. *They* know it's more comfortable inside. Easy to build, to move, to keep clean. Lifetime durability pays off year after year.



Any type of barn is better roofed and sided with rustproof, maintenance-free, heat-reflecting aluminum. Used with Reynolds *Lifetime* Aluminum nails and complete accessories, application is simple. Light weight saves labor.



Range Shelter. Experimental farms prove heat-reflecting aluminum cuts hot-weather poultry losses, improves weight. Ceiling temperatures up to 15° lower. Readily portable. 10′ x 10′ capacity 100 to 150 birds. Rustproof, last indefinitely without protective painting.

Reynolds Alumi-Drome. All-purpose farm prefab. All-aluminum. All-bolted construction. Standard unit 36′ x 60′, length variable by 6′ sections. All clear space inside. Quickly erected.

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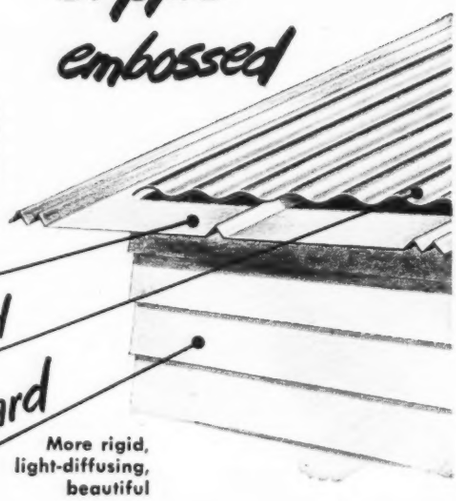

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COMING IN AUTUMN

The continuing letters about "The French Earth" (Spring 1948) showed our editors that *Farm Quarterly* readers like to know how farmers in foreign lands go about the day's work. The Autumn issue will take you behind the Iron Curtain for a visit with the Yugoslav farmer, whose country is now being blown about by the shifting winds of international policy. To get this story, our editor, R. J. McGinnis lived and worked with Yugoslav farmers during an extended stay in Tito's country. He brought back an absorbing story on the primitive methods of the Slav peasant farmer.

The subject of Trace Minerals, and their function in animal and plant nutrition, has been on the *Farm Quarterly* schedules for several years, but the editors failed to find a writer willing to tackle this controversal subject. Now Dr. Jonathan Forman, widely known for his work in this field, has prepared this article for our Autumn issue. We hope it will contribute a new understanding of this complex subject.

All-winter grazing, now established in the South, is slowly creeping Northward. The management of late fall pastures is investigated in an article on general pasture management for the Midwest. Among the articles on stock will be the latest discoveries in cross-breeding hogs, a discussion on the new hybrid chicken, and the problems and methods of shipping livestock to market.

Sweet clover, the "Queen of the Pastures", will be given the *Farm Quarterly* "A to Z" treatment in an article by Evart Vander Meulen. Another illustrated article will tell which weeds poison stock, the symptoms and cure of weed poisoning, and how to eliminate this plague.

Our executive editor, Fred Knoop, has compiled data on the plans and specifications for hog houses and made a survey of types of hog shelters developed by universities and successful hog raisers.

The USDA says irrigation is becoming increasingly popular in the Midwest. Our irrigation article will interest both the vegetable grower and the general farmer who can now irrigate his pastures during the dry season.

Among the features will be an informal discussion of the common snakes found on farms, a two-page feature on how a priest keeps down the fox population in an Ohio county, and a bit of color from the deep South in an article on the moss gatherers of the Louisiana swamps.

Also planned is an illustrated article on the vanishing covered bridge and a frank discussion of the possibilities of making a fortune from raising chinchillas.

THE FARM QUARTERLY
22 East 12th St., Cincinnati 10, Ohio

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Contributing Editors: **Ray Dunn, Myron S. Hazen, C. N. Hoffer, Charles Krutch, C. M. Long, George D. Scarseth, Katharine A. Smith.**

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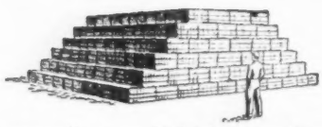
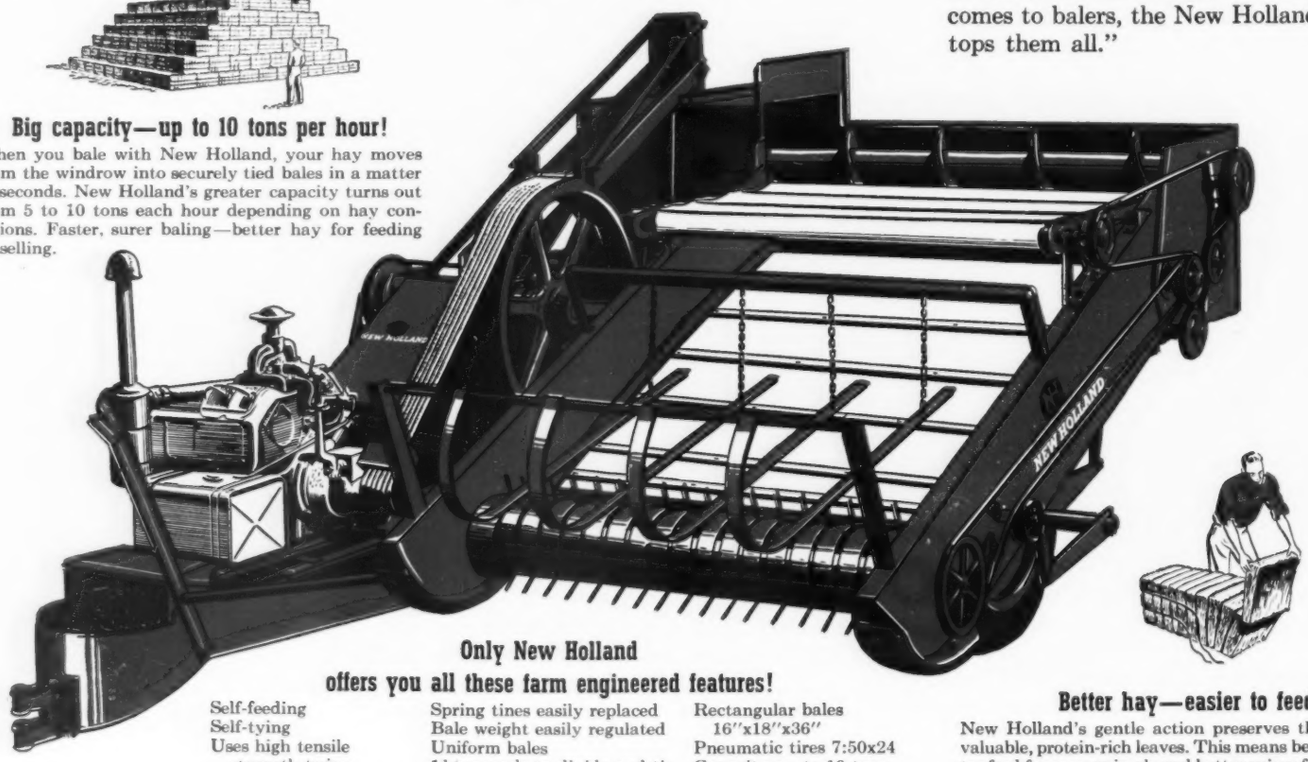
"When it comes to Balers NEW HOLLAND tops them all"

Frank Alvis, Princeton, California, writes: "My New Holland is a money-making piece of machinery . . . I have baled as much as *seven bales a minute.* When it comes to balers, the New Holland tops them all."



Big capacity—up to 10 tons per hour!

When you bale with New Holland, your hay moves from the windrow into securely tied bales in a matter of seconds. New Holland's greater capacity turns out from 5 to 10 tons each hour depending on hay conditions. Faster, surer baling—better hay for feeding or selling.



Only New Holland offers you all these farm engineered features!

- Self-feeding
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The tenderness and succulent goodness of a ham like this is the result of successful feeding . . . and its appetite appeal is assured when Seagram Solubles balanced rations* head up all the chapters of its feed-lot history. These rations, fed from growing start to full weight finish, make pigs *gain faster* for extra tenderness, *stay healthier* for true flavor, *finish finer* for proper texture, in *FEWER WEEKS* on *FEWER POUNDS OF FEED!*

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FARMER WOOD STEEL CLAD FEEDERS, designed and tested by successful hog raisers and customer proved, incorporate all the "know-how" for the Modern Feeding Method. They are steel covered and reinforced.
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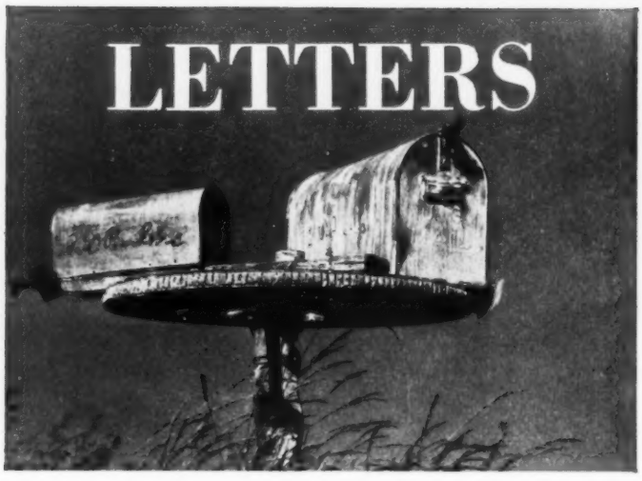


"IT'S CRUEL"

Dear Sir:

On page 18 of the Winter 1948 number of the *Farm Quarterly*, there is a paragraph devoted to a method of curing suckers among dairy cows. Being a city-bred woman converted to farming in recent years, perhaps I am "the fool who rushes in," etc., etc., ad lib., ad naus, and all the rest of it. But the method outlined seems peculiarly cruel. Here at my farm, a simple method has been used which requires neither veterinarian or psychiatrist, but which has achieved most satisfactory results. My manager merely clamps a hog ring (or two rings in the case of a stubborn animal) underneath the tongue, far back where the up-curling movement of the tongue in sucking takes place. This impairs nothing but the ability to suck. It has been in use here for the past 15 years, and there are no "suckers" in the dairy herd or among the young stock. When heifers penned together show a tendency to suck each other the manager or the herdsman immediately gets busy with the hog ringer, and there is an end to the trouble at once. I am glad to rush in with this bit of information, in the interest of protecting poor "Bossy" from such torture as having part of her tongue removed, as your article recommends. The S.P.C.A. to the contrary notwithstanding, it IS cruel, and it IS a form of torture.

Mrs. Arlington C. Harvey

North Prairie, Wis.

WIFE WANTED

Dear Sir:

Bought this forty acres two years ago, then got married the next day. She didn't like it so we called the marriage off last spring, and I like it but it is no good alone. Know of any farmer's widow that might be interested in a fifty-five year old World War One vet? German-English extraction, drink one glass of beer every month (average), smoke cigars, Christian, but no church goer. Five foot ten, 225 lbs. Need a pardner to plan things with, handle the money, if we make any, and kinda prod me into action. Am a good worker for others, but do puttering by myself.

Can't decide whether to sell or try to get another pardner. Don't want one that is broke because she would probably soon have us both that way.

Al Raether

Colfax, Calif.

OUTSIDE LOOKING IN

Dear Sir:

I bought one of your magazines recently and enjoyed it considerably, until I came to the page where you showed how the side of a steer was cut open to investigate its contents.

Tony P.

Detroit, Michigan

MOTHER NATURE AND AN OIL CAN

Dear Sirs:

Following is a hint that I feel most farmers can use. On a place I bought there were two acres of run-down grapes and dozens of willow trees which simple cutting did not kill. I tried acid, nitrate and a few other things with no success. I finally evolved the plan of cutting the tree or vine close enough to the ground to permit covering with an old five quart oil can or a five gallon bucket. This worked. In the dark moist interior of the bucket, fungi grows and covers the stump and kills it. The following spring the stump is in such shape that it can be kicked out of the ground. On stumps too large for a five gallon pail I use an oil drum or a large concrete tile with a board cover weighted down.

Herbert E. Bridgewater

Georgetown, Illinois

(Continued on Page 105)

Advertisement

$340 PROFIT OVER FEED COST from one cow alone, as shown by D.H.I.A. records, is typical of Ed's "Brae Meads Guernsey Farm" herd. The 10 head averaged 410 lbs. butterfat last year. Feeding the Wayne Way (15% protein ration made with his own grains and Wayne 32% Dairy Feed) he got more butterfat, more milk and realized more profit with fewer cows *than the year before!*

The "How" of High Net Income

By Eugene Cooper

The big problem on U. S. farms in 1949 is to find ways to cut production costs . . . increase efficiency and maintain or even increase net profits. Here's how Ed and Rosalie Farmer achieve these ends on their 170 Ohio acres.

DRIVING past Ed and Rosalie Farmer's place on R. R. 2, Rockford, Ohio, you wouldn't be impressed that it was a "showplace of success." Their's is an average looking farm . . . from outward appearances. You have to stop in and talk with Ed and Rosalie before you learn just how successful and "how big" their "little farm" really is.

When you get the inside story, you learn they are far-above-average farmers. Ed can show you a complete set of farm records that run back to 1940. He can tell you his net cash income for any year, the price of egg mash in March, 1943, or what he sold his hogs for in the fall of 1946. A few minutes looking over his records begins to unfold a story of high net profit and efficiency on Farmer's 170 acres.

Unlike most farmers, Ed believes in farming on a smaller scale and getting high net income by hitting the high markets and getting maximum production per animal unit on his farm. His ten head of purebred Guernseys averaged 410 pounds of butter fat last year. Rosalie's 106 hens laid as high as 92 eggs in one day and have averaged right at 85 percent production all fall and winter. Ed saves between 50 and 60 pigs each year from 6 to 7 sows. Those results indicate that the Farmer's get about every pound of milk, every pound of pork and every egg possible from their efforts.

Hitting The High Spots

That kind of production combined with highest market prices spells nothing but high net income. By farming on a small scale, Ed Farmer is able to time his spring and fall farrowing so his pigs hit 220 to 230 pounds in 6 months for the early September and early March markets. Rosalie's pullet flock gets into egg production in August so that she can have plenty of good-sized eggs for high egg prices in early fall.

Ed's farm record book shows they were selling about 50 dozen eggs a week last fall at 66 cents a dozen. (Most farm flocks were just beginning to lay then.) He sold his 1948 spring pigs in early September ahead of the heavy market runs. One shipment brought $28.00 a hundred; the second lot sold for $27.25. Compare that with the $20.00, $22.00 and $24.00 prices most farmers got for their spring pig crop.

Then look at Ed's dairy herd. One cow last year made him a profit of $340.00 over feed cost. His D.H.I.A. records show that. They also show that his 'Brae Meads Guernsey Farm" herd produced more butterfat, more milk and made more profit in 1948 with fewer cows than the year before. Ed found out he had some loafers in his herd. He got rid of them quickly and it showed up in his net profit column.

No Secrets For Success

Ed had developed his own formula for success. There's nothing new about it—but it is somewhat rare among today's American farmers. He states it this way. "We bought this farm of 114 acres in 1947 when land prices were high, and rent 56 acres. We decided if we were going to get it paid for we'd better make every hen, pig, and cow a money-maker. Rather than trying to farm on a big scale, we decided to do a good job with what we had. Operating costs can be kept low and the risk is much less. By feeding balanced rations and taking good care of our pigs, dairy herd and chickens, we can get the fastest and cheapest gains and production. We follow the Wayne Feeding Programs just as they're recommended. We find it pays off in the net profit column. Even though we don't have a big farm, we have comfortable living and are getting our farm paid for."

The Farmer's have a system of managing their cash income for "better farm living" and getting the farm loan paid. The steady income from the milk check pays for all the Wayne Feed Supplements and other operating expenses of farming. The cash from spring and fall pigs is paid on the farm loan. And the egg checks go to Mrs. Farmer for feeding and clothing the family.

The Farmer's feel that perhaps the days of inflated farm prices are about over. But with the efficient operation, wise feeding and management along with low operating costs, Ed and Rosalie Farmer know that they can make a good living and pay for their farm even with average farm prices. And their farm records back up their belief.

Wayne Feeds are proud of the part they are playing in the success of the Farmer's and thousands of farmers, large and small, all over the country. Never before has *good feeding* been more vital to your net profits—and in following the tested and proved Wayne Way with your poultry and livestock, you can be sure of nutrition that helps you get top results every time. For Wayne Feeds carry the "IQ" (Ingredient Quality) Seal, signifying *triple-tests*—chemical, biological and Research Farm—of its nutritive value.

There are thousands of Wayne Feed Dealers across the nation. See the one nearest you to get started on the Wayne Way to high net profits or write for free feeding information to Allied Mills, Inc., Executive Offices, Chicago; Service Offices, Ft. Wayne, Ind.

85% EGG PRODUCTION ALL FALL AND WINTER from her 106 hens proves Rosalie is right in her feeding plan. She gets 100 two-week-old sexed pullets and 100 straight-run chicks into her brooder house by March 1. Roosters are eaten as fryers; pullets thrive on the Wayne Program, producing 1st eggs early in August. Birds are culled and housed before September 1 for early fall egg production.

GROWING THEIR OWN REPLACEMENT HEIFERS is slow but sure, the Farmer's find. Here Johnny strokes a day-old heifer calf getting colostrum milk from its mother. In a couple of days, it goes on nipple-pail feeding, until 4 weeks old, and from then on, Wayne Calf Pellets, shelled corn and oats will be substituted for milk. That means up to 1,000 lbs. more milk to sell!

All these and many more engineered for the

Ford ®
TRACTOR

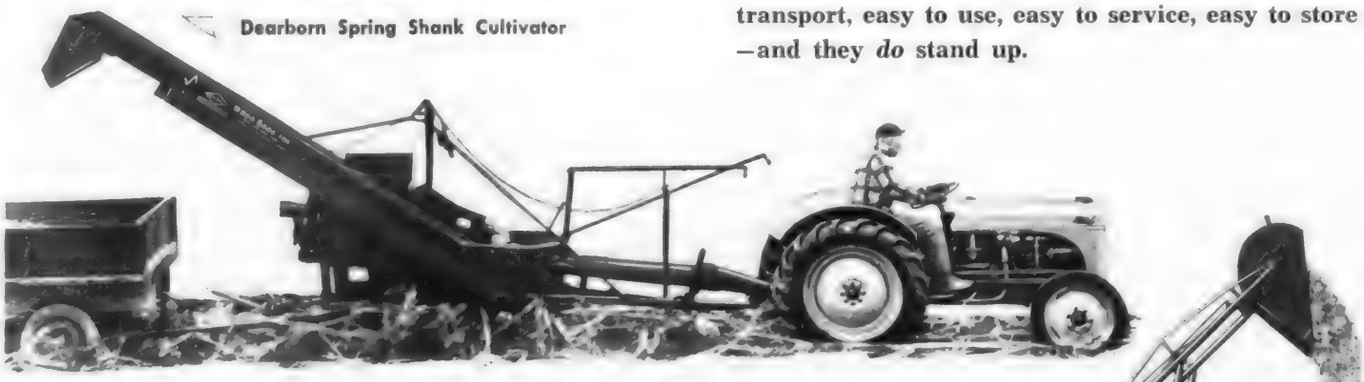
Dearborn Disc Plow

Dearborn Lift-Type Disc Harrow

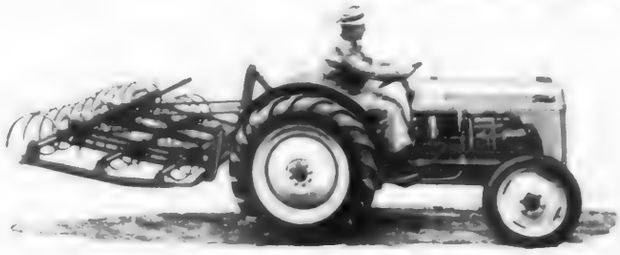
Dearborn Spring Shank Cultivator

Your satisfaction with any tractor—the amount of work you get done, the hours and muscle aches you save, the extra profit you make—all of these depend upon having the proper implements as well as upon the tractor itself. With the Ford Tractor and Dearborn Implements, you have the *right combination* because tractor and implements are planned from the ground up to work together.

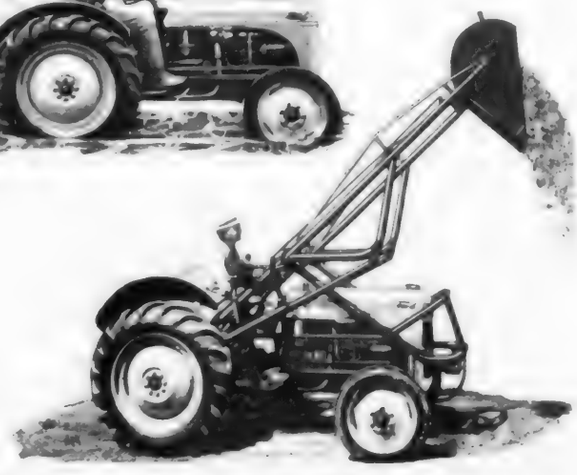
Dearborn Implements give farmers the rugged construction they like, plus the uncompromising quality that means long life and low lifetime cost. All but a very few can be attached or detached in three swift operations, saving precious working time in the field. Dearborn Implements are easy to transport, easy to use, easy to service, easy to store —and they *do* stand up.



Dearborn-Wood Bros. Corn Picker



Dearborn Spring Tooth Harrow



Dearborn Heavy Duty Manure and Material Loader

And every Dearborn Implement is specially engineered to work at its best with the Ford Tractor.

A few of the implements in this great line are illustrated on these pages. Many more are available, making it possible to keep a Ford Tractor profitably busy anywhere, any time, all 'round the farm—making it a real "Year 'Round Tractor."

DEARBORN MOTORS CORPORATION • DETROIT 3, MICHIGAN

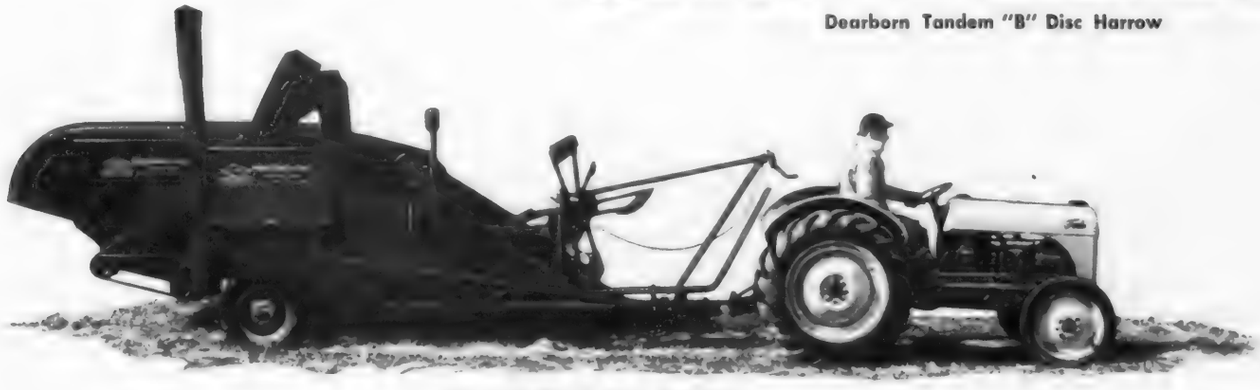
Look For This Sign . . .

It marks the headquarters of your nearby Ford Tractor dealer. He and his organization sell Ford Tractors and Dearborn Farm Equipment and offer you expert service and genuine parts. Under this sign, you will find a genuine interest in serving you well.

The only time that Counts is Working Time

Dearborn Scoop

Dearborn Tandem "B" Disc Harrow



Dearborn-Wood Bros. Combine

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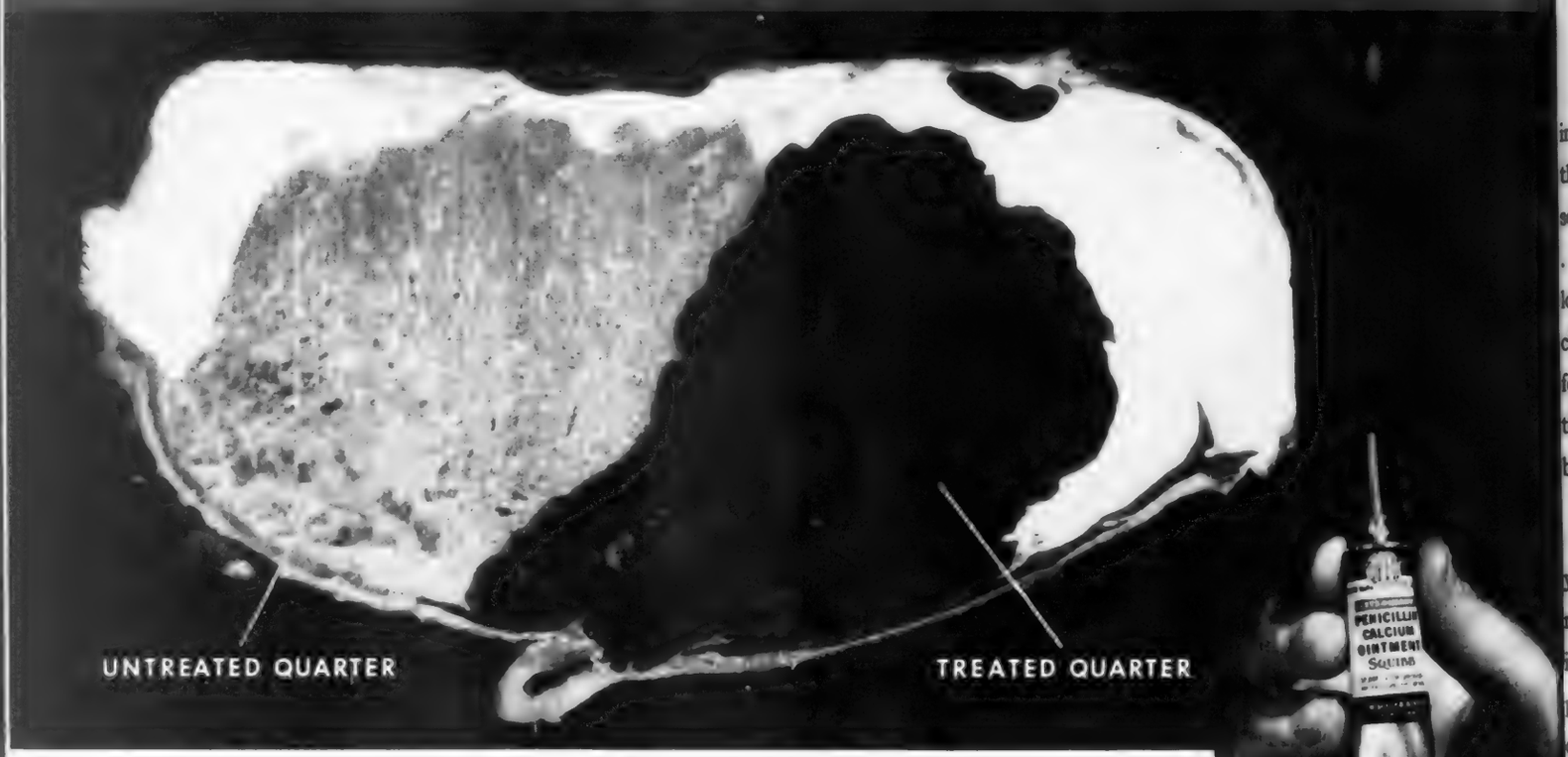
Ford Farming MEANS LESS WORK . . . MORE INCOME PER ACRE

See for yourself why Squibb "instant-use" Penicillin is so effective for Mastitis*!



Note the dispersion of SQUIBB OINTMENT throughout the treated quarter!

A simple experiment, results of which are shown in this unretouched photograph, demonstrates how thoroughly treatment with Squibb Ointment disperses penicillin throughout a cow's quarter.

One quarter-ounce tube of Squibb Ointment, carrying a dye, was instilled into one quarter of a cow's udder. When the cow was killed 17 hours later, the udder was removed and frozen.

The above cross-section photograph was then taken. You can see from the blue dye how the ointment dispersed throughout the treated quarter, even to the uppermost regions.

The reason for this thorough dispersion is that the ointment has the proper melting point and floats up through the milk in the udder—one of the important factors in making Squibb Penicillin Calcium Ointment especially effective in treating mastitis*. 2 tubes are sufficient for most cases.

See your druggist now—and get Squibb "instant-use" Penicillin Calcium Ointment. Keep a supply on hand! *For accurate diagnosis of mastitis, call your veterinarian.*

*Due to *Streptococcus agalactiae*, the cause of the largest percentage of all mastitis cases.

FREE BREEDING CHART!

Handy—valuable for keeping breeding and freshening records. Write for yours—and for booklet on Mastitis Control. Address E. R. Squibb & Sons, *Veterinary and Animal Feeding Products Division,* Dept. FQ-29, 745 Fifth Avenue, New York 22, N. Y.

SQUIBB — A NAME YOU CAN TRUST

LOOK AT THEM *ALL* —

THE HARDER YOU ARE TO PLEASE... THE *better* YOU'LL LIKE A JOHN DEERE

No other equipment investment is more important than your tractor. Its purchase deserves thoughtful consideration . . . *complete* investigation. So look at them all before you decide—choose the one with most of the features that count. We feel certain the harder you are to please the better you'll like a John Deere.

In modern design which offers you the latest engineering advancements for speedier, easier farming as well as in proved, *two-cylinder* performance which insures years of faithful, low-cost service, John Deere Tractors are today's leaders. Give your John Deere dealer a chance to prove it.

HIGHLIGHTS OF JOHN DEERE TRACTORS

Cyclonic-Fuel-Intake Engines in both gasoline and all-fuel types for eager, economical power on the fuel of your choice ★ Hydraulic Powr-Trol for finger-tip operation of integral and drawn equipment ★ Roll-O-Matic "Knee-Action" Front Wheels for easier steering and greater riding comfort ★ Quik-Tatch Working Equipment to meet every need ★ Adjustable, Deep-Cushion Seat ★ Sit-or-Stand Platform ★ Tapered Fuel Tank for unexcelled view ★ Convenient Hand Clutch ★ Multi-Speed Transmission ★ Automatic Crankcase Ventilation ★ Electric Starting and Lighting Equipment — all in addition to Exclusive *Two-Cylinder* Design which provides fewer, heavier parts for greater dependability and economy, longer life.

For every farming need...

. . . there's John Deere Quality Equipment to lower your costs and increase your profits, to speed up your work and make it easier. The great, modern line of John Deere Tractors and implements is described and illustrated in a colorful new edition of "Better Farming" just off the press. Write to John Deere, Moline, Ill., for your *free* copy today.

JOHN DEERE

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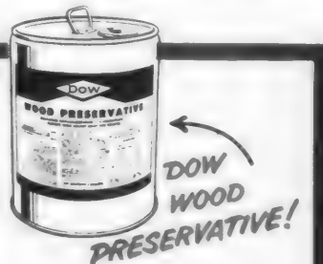
chlorophenol

Do you spend valuable time replacing fence posts . . . time you'd like to give to a thousand-and-one more profitable jobs?
Today you can save both time and money by treating your fence posts with Dow PENTAchlorophenol. This *tested* wood preservative prevents decay and can be applied simply and cheaply right on your own farm. You just soak the posts for the required length of time in a solution of "PENTA" and petroleum oil. Your empty oil drums will serve as containers for the soaking. Do this and you will have long-lived fence posts and lumber free from decay and termites.
Start today to protect your fence posts and lumber. Send for free booklet "Post Preservation Pays". It tells you how to treat posts at home—on the farm. Ask for booklet PE 30.



DOW WOOD PRESERVATIVE!

. . . A solution containing PENTAchlorophenol suitable for treating fence posts is now available at your local Dow dealer!

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

DOW
penta-
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FARM BOOKS

American Farming (4 vols.) by Andrew Boss, Harold K. Wilson, and William E. Petersen; Webb Publishing Co., St. Paul, Minn. $15.

City men who have invested in a farm are often heard to say, "If things really get tough, I can move out to my farm and make a living." A farmer might, with equal logic, buy a set of oil paints so that he can turn to portrait painting in case of crop failure. A competent farmer, like a competent artist, is the product of training and experience. At one time book larnin' was held in contempt as a method of training a farmer, but now there is almost as much required reading for a farmer who wants to keep up with the science of agriculture as there is for a physician. It should not be surprising then that the authors of *American Farming* have filled four volumes and turned out only an introduction to modern agriculture.

The authors of this series, the late Andrew Boss, Harold K. Wilson and William E. Petersen, all served on the faculty of the University of Minnesota. Dr. Boss was a pioneer and one of the nation's outstanding authorities in the study of farm management and economics. Dr. Wilson is a Professor of Agronomy at Minnesota, and Dr. Petersen is a specialist in animal husbandry. Dr. A. M. Field, Professor of Agricultural Education at the University of Minnesota, acted as general editor for the series and is responsible for the over-all plan of the books.

Each volume of the series attempts to present a cross-section of the whole of American agriculture from a different point of view. Volume 1 (*An Introduction to Farming*) presents all phases and types of farming in an elementary, understandable manner. Accounting methods, farm mapping, soil needs and the like are studied in Volume 2 (*Organizing the Farm Business*) as these practices apply to all types of farming from cotton growing to raising poultry. Volume 3 (*Operating and Managing the Farm*) takes up work programs, marketing problems and management procedures; and Volume 4 (*Farm Ownership, Production Programs, Breeding and Improvement*) presents farming from the point of view of an investment, covering the financial and legal aspects of the business as well as programs for the improvement of the farm. This organization of material makes it possible to read each volume as a separate unit with its own special approach to the problems of farming.

On the other hand this arrangement has produced a rather cumbersome set

(Continued on page 144)

New Ideas FOR BETTER FARMING

Proved . . . and approved . . . for 50 years Half a century ago — when the first NEW IDEA Spreader went into action — America's farm lands got a new lease on life. Here at last was a quicker, easier way of applying manure on the soil — a *proved* way of extracting its full fertility value. Here was better farming!

The same has been true of every addition to the NEW IDEA line of specialized machines. Each has repeatedly demonstrated its ability to do a particular job better on farms from coast to coast. Each has solidly established its exceptional durability in matchless service records. That's why NEW IDEA has always been the equipment buy-word for a vast majority of farmers. NEW IDEA Division — AVCO Mfg. Corporation. Factories: Coldwater, O.; Sandwich, Ill.

Send for special free Anniversary Literature Packet, consisting of a profusely illustrated Golden Jubilee Booklet and a General Catalog describing all New Idea Farm Machines. Mail a post-card today!

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★ $50,000 Premium Climax Show, All Breeds
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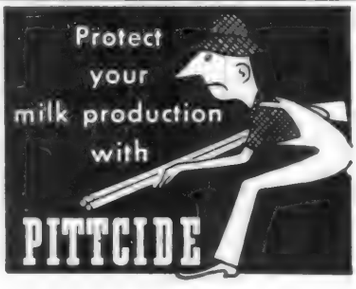
Enter your top show animals, in competition for the largest premiums ever offered dairy breeders! Enter your commercial exhibit, for the farm or processing market. Exhibitor accommodations and cooperation will please you thoroughly.

Attend the Exposition in person—send your farm and company men. Broaden your friendships throughout the Breeds and Industry—and know at first-hand the men, animals, methods and facilities that are building ever-greater economic effectiveness and stability for the entire Industry.

Profit from recognition earned by your entries and exhibits—from valuable information and associations—from new Dairy Industry unity to be gained—from enhanced public awareness of the Dairy Industry's value for the Nation's greater welfare.

Write today for further information, show catalog, exhibitors blanks, hotel reservations: Secretary, International Dairy Exposition, Inc., 130 E. Washington St., Indianapolis, Indiana.

1st ANNUAL
INTERNATIONAL Dairy EXPOSITION
PERMANENT HOME—INDIANA STATE FAIRGROUNDS
INDIANAPOLIS, IND. OCT. 8-15, 1949



Bactericide, disinfectant, deodorant—Pittcide puts the proved sanitizing powers of chlorine to work for you.

1. Helps maintain low bacteria-count milk.
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No. 21—FOR NECK. Adjustable chain. Numbered both sides. $11.50 per dozen.

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Price: $14.50 per dozen

Sample mailed for $1.00. Write for folder.

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The Dairy Barn

A BRIEF SUMMARY OF THE NEWEST DEVELOPMENTS IN DAIRYING AND THE CARE OF DAIRY CATTLE

Production Predictions

Dairy farmers have always taken for granted that the only way to see whether or not a heifer calf would become a good milker was to raise her to producing age. This costs about $200, money wasted if she proves better for hamburger than milk production. W. W. Swett of the USDA Bureau of Dairy Industry, Beltsville, Maryland, has found a method of picking the best producers while they are still calves.

He discovered that the development of the mammary glands starts soon after heifer calves are born. He noticed also that some calves show more promising development at tender ages than do other calves. In his limited test the system worked, and was proved helpfully accurate when the calves grew up and came into production. Four months was found to be the most reliable age at which to forecast an animal's production ability.

This piece of research still needs considerable checking. While it looks promising, scientists are careful to point out that it still isn't ready for general use, because too little is known about it.

Cows Can Be Foster Mothers

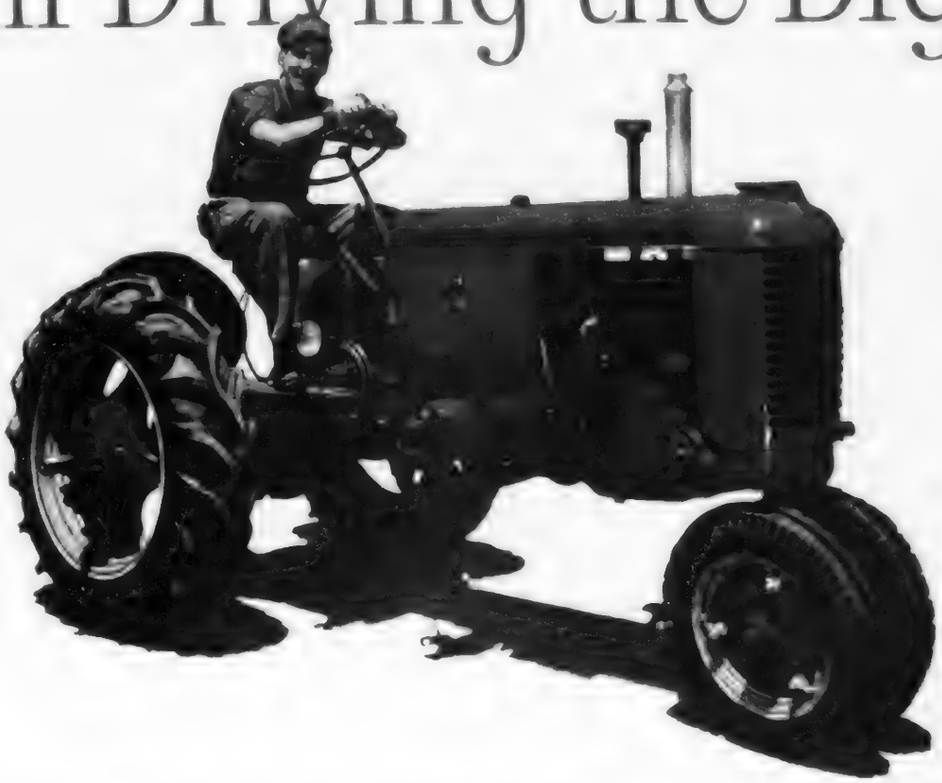
After seven years of tinkering with the sex life of the cow, Dr. Raymond Umbaugh, of the Foundation of Applied Research, San Antonio, Texas, has learned how to make a scrub cow give birth to a purebred calf of which she is not even the mother, biologically speaking.

Umbaugh has developed a method of taking the fertilized egg from a purebred cow and planting it in the body of the scrub animal where it grows until birth.

In his cattle experiments Umbaugh used 750 cows. He managed to control the ovulation time of the cows by administering a hormone from sheep. Normally a cow is content to develop one ovum or egg at a time. Umbaugh has managed to speed up this process so that test cows now develop several ova at about the same time.

Tying all these advancements together he has more than a collection of interesting scientific experiments. He is working toward the time when he can collect several eggs from one purebred cow, plant each egg in a different grade cow and sit back and wait for the grade cow to drop a purebred calf. By this method it would be possible to change all cows in the country to high quality stock in a single generation. Umbaugh feels that, while the experiments are still not completed, and to date

I'm Driving the Big Bargain



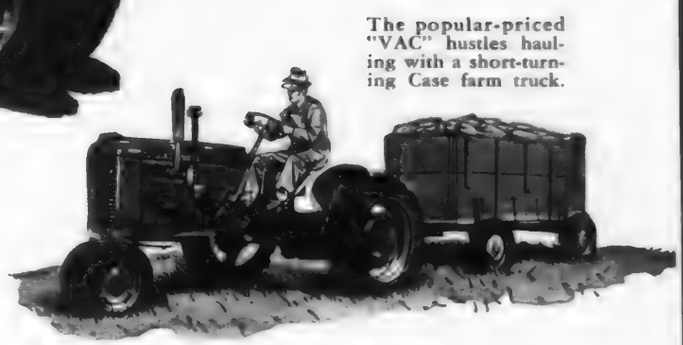
····IN THE LOW PRICE CLASS

"For my money, this Case 'VAC' is the best buy in the popular-price class because it gives me more results—the reasons why we buy and use tractors. I've compared it with other tractors I have owned, and a lot more tractors I have worked with, helping back and forth among neighbors.

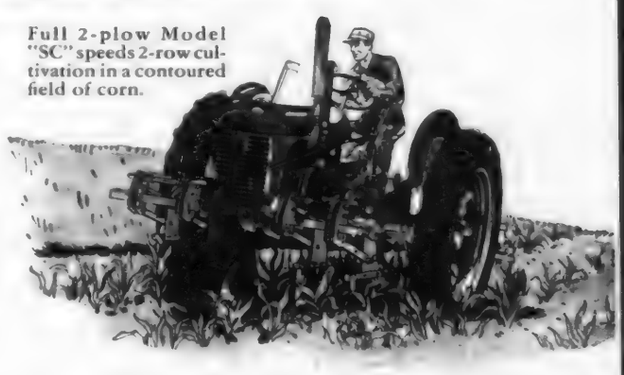
"Taking farm work as it comes, from plowing and cultivating to haying and hauling, I get more done in a day with the 'VAC.' It's more than traction and engine power and the right gear speed for every job. It's time saved in turning, hitching, mounting implements, fueling and lubrication. It's strength saved with quick-dodge steering and hydraulic lift.

"Its rear-mounted plow works close into the corners, and its front-mounted cultivator works close to the row. With planter and all, I saved real money, thanks to the Master-frame that serves as mounting for many implements, makes less weight to handle, takes less room to store."

That's not the word of one man, but the way thousands of owners talk. Whether it's the "VAC" or one of the other 19 Case models that fits your farm, find out for yourself about the extra capacity, extra convenience, and extra ENDURANCE of Case tractors. See your Case dealer now.

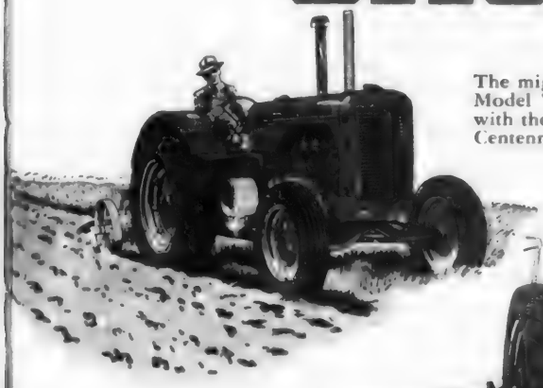


The popular-priced "VAC" hustles hauling with a short-turning Case farm truck.



Full 2-plow Model "SC" speeds 2-row cultivation in a contoured field of corn.

CASE



The mighty 4-5 plow Model "LA" at work with the famous Case Centennial plow.

Model "DC" with 3-bottom Case Centennial plow in a heavy crop of lupines.

4 Power Groups 20 Great Models

"VA" Series—Full 2-row capacity in the all-purpose "VAC" shown above; 2-plow capacity in most soils and conditions, 1-plow in extra tough conditions.

"S" Series—Full 2-plow capacity in practically all conditions; extra speed under usual conditions.

"D" Series—Fast 3-plow, 2- or 4-row capacity. All of these three sizes built as:

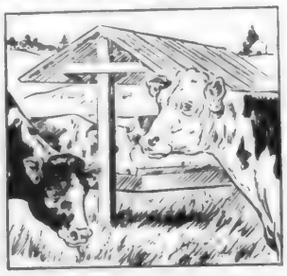
All-Purpose Models for row-crop farming.
Adjustable Front-Axle Models for truck farming.
Standard 4-Wheel Models for small-grain farming.
Orchard and Grove Models for tree farming.

The Mighty "LA"—Four-wheel type; 4-5 plow capacity for heavy-duty tillage and belt work.

Special Models for rice, cane, and vineyards; also high-clearance, 4-wheel specials of all-purpose models.

Send for catalog. State size tractor to fit your farm; address Dept. F-90, J. I. Case Co., Racine, Wis.

Fight "HIDDEN HUNGER"



FREE ACCESS

3 ways

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. . . to protect your milk cows, young and dry stock and beef cattle from profit-robbing:

"HIDDEN HUNGER"—*Lack of essential mineral elements needed by livestock for sturdy health, rapid growth, peak production and reproduction.*

Near's MinRaltone protects against this menace because it contains 11 essential mineral elements (plus Vitamin D) which *may be lacking* in the daily ration. Write for free information about supplementary mineral feeding and the 3 WAYS of feeding MinRaltone year round.

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50th Year

MINERAL FEED SUPPLEMENT for HEALTH PRODUCTION PROFITS

FARM MANAGEMENT SERVICE

Management: Supervised management—Farm analysis and survey reports.
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A Complete Farm Service For Absentee And Active Owners

ORBAKER AGRICULTURAL SERVICE

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no calves have been born by this method, it is only a matter of time until the owner of a scrub cow may take the animal to a station where she will, for a small fee, be impregnated with the egg of a purebred cow.

Blood Test For Cows

On the campus of the Ohio State University is a laboratory where, amid test tubes and microscopes, Dr. Lloyd C. Ferguson spends his time studying cows' blood.

From the assumption that not all cows have the same kind of blood; he has worked out methods of identifying 40 different characters in cows' blood. These characters are called antigens, and are inherited in the same way as eye or hair coloration in humans.

The value of a bovine blood test is proved when it becomes necessary to determine the parentage of a calf. Breed associations will not register a calf if there is a question about which bull sired it. A blood test will help find the father. When young calves run together the farmer sometimes has trouble deciding which cow owns which calf, and can now rely on a blood test to tell him. With the increased use of artificial insemination there is a growing possibility that a mistake in the records can credit a calf to a bull that never sired it. A blood test will usually show up the mistake. It is also possible that after a cow is artificially inseminated she may be bred by a bull in the field, and a test will determine which sire should get the credit.

DR. FERGUSON

To find out which bull sired a calf, Dr. Ferguson first checks the calf's blood and makes a list of all the antigens present. From there it is a process of elimination. If the calf is carrying blood characteristics that neither his mother nor his suspected sire have in their blood it becomes evident that some other bull sired the calf. Because of the wide range of possible combinations of the antigens a blood test will nearly always show up some differences that establish the calf's parentage.

Dr. Ferguson with the blessing and financial support of various breed associations, is still busy learning new things about the blood of cattle. He is trying now to work out a system of forecasting production ability, size, and temperament of cows by analyzing their blood. When he has perfected this technique he will be able to forecast the worth of calves before they are raised to maturity. Farmers, by this method, may eventually be able to learn the potential worth of a cow before they buy her as a calf, or before they feed her for two years. ★ ★ ★ ★

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Cajun Farmer

BY R. J. McGINNIS

Joe Stelly and his family are hard-working, thrifty Cajuns who make a comfortable living from sweet potatoes and cotton on their seventy acre Louisiana farm.

A MOCKING bird in the magnolia outside Joe Stelly's bedroom window was rehearsing a song stolen from a robin the summer before. Half awake, Joe thought for a moment it might be a robin, and it might be spring, so bright and warm was the sunshine that slanted across the sill.

But it was mid-January, and he had over-slept on this fine Sunday morning. He would have to hurry to do the chores and be in time for late mass at Father Barrileaux's church down the highway.

Joe owns 75 acres near Opelousas, Louisiana, in the Bayou Teche country in St. Landry Parish. Joe was born, and lived for 27 of his 42 years near Arnaudville, 15 miles to the southeast, on Bayou Teche.

His boyhood there was not without adventure, but it was hard too. He remembers when his grandfather gave him his first lesson in a pirogue. No two pirogues are alike. Hewn from a solid trunk of cypress, they are paddled like a canoe, but are not as stable even as that highly temperamental craft. They say a man dare not shift his chew of tobacco in a pirogue for fear of upsetting it. Joe's grandfather had made the pirogue himself and he was a master craftsman. It was light and swift and once you gained the know-how, you could maneuver it like otter in the water. He learned how to balance himself so that he could lean far out to take an animal out of a trap along the bank. And he could land a 30-pound catfish without shipping a spoonful of water.

THE JOY OF LIVING, characteristic of the French, has survived in the Cajuns, so far and so long from their homeland, and has colored the way of life of the many races and nationalities which have gone into the patchwork history of Louisiana.

He remembers too the dank smell of the swamps, which he did not know was a smell at all until he went to work away from home. And he recalls how he became indifferent to the alligators and the cotton mouth snakes that infested the swamps and how he instinctively kept out of their way. Sometimes, when the fishing was good and he started for home too late, night caught him. The mosquitoes came out in myriad armies; bobcats screamed and night birds set up their chorus. The swamps, so quiet by day, broke into a fury of sound at night. Only one born to the bayous and swamps could have threaded that maze of channels, for there are few landmarks, only miles of still water and an unbroken never-ending procession of moss-covered trees.

For as long as he could remember he had dreamed of a white cottage on his own farm. This was what he saw as he paddled his pirogue through the bayous, running his trap line. And when he went to work in the cane fields in his early teens he dropped his weeks' wages into a tin can which he hid in the rafters of the chicken house, saving for the day when he could count enough to make a first payment.

Joe is a Cajun, a descendant of the Acadians who were driven out of Canada by the English and found refuge in Louisiana in 1765. Cajun, a corruption of Acadian, is a proud title in Louisiana, for the French are the most powerful racial group in the state. French culture has dominated and absorbed in turn the less vigorous Spanish, English and German cultures in Louisiana's patchwork history.

Geography and temperament combined to keep the Acadian blood pure in Joe Stelly's family. A persecuted people, the Acadians distrusted others and kept to themselves; and the bayous sealed off free communication with the outside world.

Until he was 27 years old he knew nothing but French. The few weeks of schooling which he got when he was a boy was in French. He heard French in his church and at the corner grocery store; French traders bought the muskrat pelts

BOUDIN SAUSAGE

MRS. STELLY (left) guides Boudin sausage into a casing. This is the way she makes it: Cube lean pork, season to taste with salt, red pepper, black pepper and garlic, and cook over a slow fire until the meat falls apart. Cook and steam an equal amount of rice. Chop finely equal amounts of parsley and onion to a bulk of about one fourth of the rice and meat. Mix by hand. Stuff into casings and twist into sections. Cook and serve hot or cold. Here is her recipe for smoked sausage: Grind neck, backbone and fat trimmings, season with salt, whole black pepper, cayenne, sage, and mace; mix by hand and regrind; stuff into casings, tie in links, dry in the open for 24 hours, smoke over a slow hickory fire for 48 hours.

which he caught along the bayous, and he courted his wife in French. Now he speaks with a heavy accent, and since he recently had all his teeth removed, only his wife and children are sure of what he might be saying.

He is a stocky, dark man with a quiet smile, somewhat shy of strangers. His wife, a pretty woman who speaks English with an attractive accent, attended a Catholic school and is a person of good taste and charm. The two Stelly children, Merlin 17, and Myrtis 15, are like modern young people everywhere. They will have little of the ancient Acadian in them when they grow up.

The social life of Joe Stelly and his neighbors is simple, elemental, and satisfying. Throughout the French part of Louisiana there is a *joie de vivre* that makes every-day living, if not an adventure, at least a way by which one can grow old gracefully. They take in an occasional picture show in Opelousas, bingo or a supper at the church, and there are almost always fish fries on a holiday. The fish fry is a Cajun institution. The rivers and the bayous abound in the succulent catfish. This fish, held in low repute by some who have not had it served Cajun style, is scored with a sharp knife, rolled in corn meal, and dropped into a kettle of hot fat. Served with hush puppies, a blue cat thus prepared is an attraction that might well justify a sidewise glance from the Louisiana Chamber of Commerce. Pompano or whitefish will never taste the same after a Louisiana catfish has tickled the palate.

A deal of coffee drinking is done too; the Louisianian serves coffee at the drop of a hat and orders his work and his life around a dripper. The potency of the creole brew is known far and wide throughout the nation. A guest is plied with the beverage during all his waking hours and when his visit is done, he comes reeling out of

the state with a new respect for a people who can drink the stuff from the cradle to the grave without noticeable corrosion. Alongside Louisiana coffee our pale northern brew is eyewash.

When Joe was a young fellow he attended country dances and sat in the bull pen with other unattached males until he met his future wife. He and his family sometimes will drive back to their home community for a dance, but now he sits along the sidelines and watches his children jitterbug.

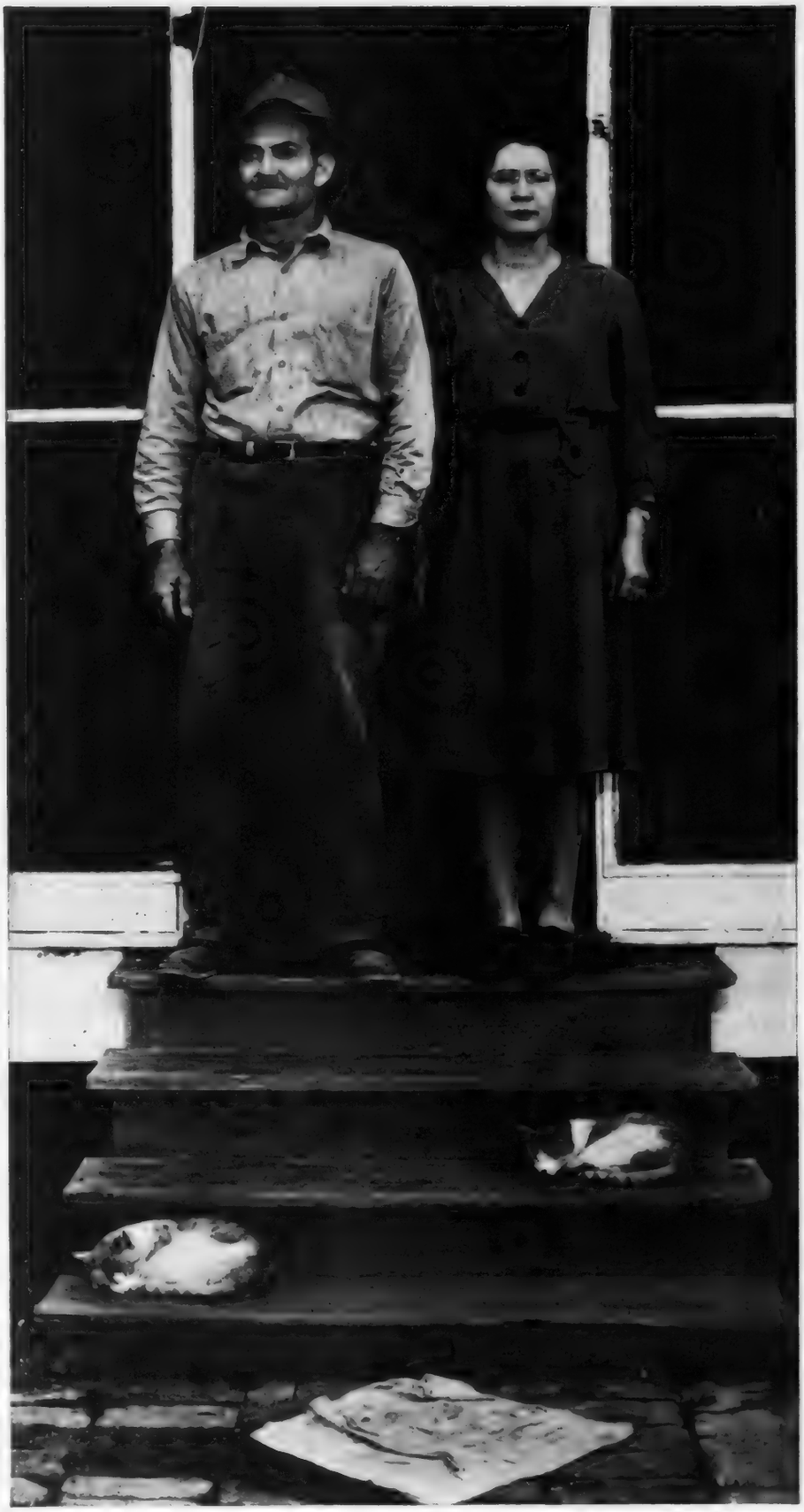
He likes to hunt and fish, and occasionally joins in a fox or bob-cat hunt, but he's generally too tired or too busy to do much night prowling after a pack of dogs

Like almost all the French of Louisiana, the Stellys are Catholics and their church is the important factor in their every-day lives. Their priest, Father Barrileaux, is in all matters the leader of the community. It is through the priest and the church that the old Acadian way of life has been nourished.

Until 1920 Joe Stelly had never seen a paved road, an electric light, or a tractor; but when Huey Long began to spin a network of hard surfaced highways through the bayous, and electric gadgets began to appear in the homes of the more affluent farmers, Joe Stelly began to wonder if there weren't places in the world outside Arnaudville where a man could make a better living and better return for his thrift and labor. Joe is thrifty, but he deserves no credit for this and does not regard himself as being more thrifty than his neighbor. Of all the traits which the Acadians brought to Louisiana, thrift was one of the strongest and commonest. He is also progressive, which is not too common among the people of his state, where the winters are kind and many of the effete luxuries of the East are unknown, and therefore not longed for. His progressive turn of mind took him out of the isolation of Arnaudville where cotton bled the land and in late years where the sweet potato weevil made this alternate crop a hazard. When he came to Opelousas he had a little nest egg, and went in debt for the remainder of his 75 acres.

Farm land in Louisiana is difficult to come by. The large land owners, those with big cotton, rice and cane plantations, hold tight to their ancestral acres; when the Acadians first came to the bayous each family took holdings with water frontage since the waterways were the only means of transportation. With each generation the river frontage was split among the heirs so that in some places, notably on Bayou La Fourche, a baseball can be thrown from the center of one farm to another for more than a hundred miles. Many of the farms there have a few hundred feet of frontage on the bayou, and extend for as much as one and two miles back into the hinterland, a ribbon of land difficult to fence and to work. Joe was lucky to obtain his small farm when a large plantation, cottoned out and losing money, was broken up.

He thought for a time that he would like to grow tobacco. Not the conventional



THE CAJUN HUSBAND is encouraged by his wife to believe that he is the head of the household. She stands behind him, but she has both hands against his back, pushing. Mrs. Stelly prodded Joe away from his bayou garden patch to the neat farm which they now own. Many Cajun girls are educated in the parochial schools; but the boys are often absent from the public schools, working, fishing or running their trap lines.

THE MULE is power king on small Louisiana farms, but tractors are coming in fast.

JOE STELLY makes thousands of "slip" holes per acre with his sturdy forefinger.

SEED POTATOES are sealed in rat-proof and weevil-tight sheds and dusted with DDT.

crop for pipe and cigaret, but perique tobacco, that potent black leaf that the Acadians learned how to grow and cure. The nation's supply of perique is grown in a small acreage in St. James Parish. A dark, strong variety of tobacco, it is cut green, packed into hollow logs or wooden tubes, and the juice squeezed out by pressure. The extracted juice is then poured back over the leaves and the process repeated until cured. The result is lethal, and only a brave man would use it straight. It is mixed with milder tobaccos for pipe mixtures.

He gave up the perique when he heard of land for sale near Opelousas.

His farm cost him $55.00 an acre. On it were the typical, small Louisiana farm house and a small barn, formerly used by a tenant on the plantation. Variations of this type of farm house are seen everywhere south of the Mason and Dixon line, usually a story and a half, unpainted with a mud chimney and hand-split cypress shingles. A breeze-way, connecting the sleeping and living parts of the house, typical of Tennessee rural architecture, gave the name "dog-trot" to this type of farm home. The barn, small and unpainted, was just large enough to take care of two or three horses. There were no tool, grain, or crop storage buildings on the place and these Joe built during his first three years of occupancy. He built a sweet potato "kiln," a cement floored, ventilated building for sweet potato storage. He also built a seed house for his sweet potatoes, isolated from the other farm buildings, and ratproofed. Five years after he went on the farm he had paid off the mortgage and had enough cash ahead to buy much of the material for a new home. He tore down the old house and built himself a small modern bungalow. He did most of the carpentry work on this himself, trading labor with the neighbors when he needed help. Joe is proud of this home, which would be called a mansion on the bayous. Twenty years ago, a home such as this on a 75 acre farm in Louisiana would have been a seventh wonder. He has a refrigerator, a gas stove and an electric water system. It was a great day when he moved his plumbing inside and installed a bathroom.

He could not have made these improvements from the income, even from 75 acres of the best land in St. Landry Parish. Nor

THE FATHER of the Louisiana sweet potato is Dr. Julian C. Miller, of the state university. Until he developed a bloom on a potato vine, the first scientist to do this, improvement was limited to selection. He now has the aid of cross pollination in improving the plant.

IN EARLY SPRING the shed is opened and the potatoes planted end to end 6 in. deep.

THE POTATOES go to the packing sheds where they are cleaned, graded, inspected.

A POTATO damaged by a weevil is unfit for market, but it can be saved for feed.

could Joe have made the move from the bayou, nor found the will and way to buy his farm without the help, and perhaps prodding, of his wife. It is the French custom for the wife to remain in the background, but she always has her hands against her husband's back, pushing him to a better way. Joe has supplemented his farm income by seasonal work in the various sweet potato packing plants in Opelousas. All over Louisiana small farmers have this opportunity to piece out their incomes by seasonal work. It may be in the cotton fields, in the cane fields, or the sugar refineries, in the rice harvest, or, in recent years, the oil fields and refineries. Wages are not high. A common laborer who hustles crates in a potato packing plant gets 40 cents an hour with no premium for overtime. A weigher or sorter gets 50 cents.

Joe has the help of his wife and two children, who help in the fields during the busy season when a pinch comes. Most Louisiana money crops require a great deal of hand labor. Sweet potato planting and digging is almost entirely a hand job; strawberries require hand labor during the picking season, as does cotton.

Small farms are worked almost entirely by horses. The lack of all kinds of farm machinery puts a premium on primitive hand labor. Joe has no tractor and he is just beginning to dream of the small "one-team" type of tractor that is coming on the market.

He has two poky mules and a horse and a small assortment of simple horse-drawn tools. The horse is a "spare." It pinch-hits for one of the mules, and has been trained to work singly to a one shovel plow.

He has six head of cattle. Three are milking cows with traces of Jersey and Guernsey, and three calves, equally undetermined. His cattle are no better and no worse than the native cows of Georgia, Alabama, Florida and Mississippi. Somewhere, generations back, was a Jersey or a

THE SHARE CROPPER on Stelly's farm lives in a very simple dwelling. He uses Stelly's tools and mules and gets one third of the cotton and potato crop on about half of the 70 acres. If lucky he makes $1,200. He does outside work during the winter.

Guernsey thinned down by the poor winter pastures, little grain and no shelter. The run of Louisiana animals are sparse in milk and butterfat, puny in size and tough as an inner tube on the platter. The lack of grain, winter pastures, poor shelter and breeding, ticks and other pests are handicaps to good dairy cattle that are slowly being overcome in the state. Now that good dairy herds are increasing, milk shipments from the north are decreasing.

A better grade of beef cattle for the average farmer seems to be on the way in various crosses with Brahmas. The offspring of the Brahmas and native stock has crossbred vigor and stamina. From their Brahma sires the calves get the ability to resist heat and ticks, and they arrive at acceptable finish on the native grasses and the cow's milk. A calf from a scrub cow and a Brahma bull will top its mother in weight within a year.

Here and there one finds good cattle and good pastures. In 1947 Louisiana 4-H youngsters took more prizes at the National than any other state; but the average of the cattle and pastures are low. Generally the best stands of pasture grasses are along the highways and the constant hazard to driving of roaming livestock has cut down fast traffic better than any police patrol. Louisiana legislators are reluctant to sponsor a law to forbid free range, for there are too many voters whose animals would starve if it weren't for the "state pastures."

Joe Stelly is one of the few farmers in his community who has branched into a sizable hog program. In the fall of 1948 he sold 20 fat pigs and carried over as many more gilts and young pigs Mrs. Stelly raises 150 chickens each year and her butter and egg money releases most of the income from the rest of the farm for improvements. She is famous in the neighborhood for the quality of the garlic which she raises in her garden and sells.

Crops

Joe Stelly is as near to being a general farmer as one will find in Louisiana. The farmers and plantation owners of the state are inclined to put all their eggs in one basket, depending on one major crop. A regular rotation with a variety of cash crops in combination with a livestock program is difficult to achieve where soil, geography and climate push one into specialized crops.

St. Landry Parish (40 miles from the Gulf, 40 from Baton Rouge, and 40 from the River) lies on the edges of four specialized crop areas of the state: northward and extending to the borders of the state, cotton is the main crop; eastward it is cane; to the west is rice and in recent years an increasing interest in cattle; to the south is the sweet potato, concentrated in a rather restricted area within a great sugar cane district.

Joe Stelly's main crop is sweet potatoes, but he also raises some cotton and corn. The depleted soils require either a rotation or expensive applications of fertilizer. The corn is largely a gesture in this direction, for Joe plants soybeans in the corn and plows it under as green fertilizer. He will occasionally substitute lespedeza for beans. He uses the corn for his hogs and to provide a bit of supplemental winter feed for his cows and chickens. Control of the sweet potato weevil makes it unwise to plant sweet potatoes in a field two years in succession. So between the corn, cotton and sweet potato, plus such cover crops as soybeans, white Dutch clover and an occasional crop of sour clover, lespedeza, or vetch, Joe works out his rotation, which is potatoes, cotton or corn, potatoes. It is on his sweet potato crop that he stakes his income and it is around this crop that the other crops are planned.

The Sweet Potato Wizard

There is a brilliant plant scientist at the University of Louisiana who has achieved immortality as the father of the sweet potato industry in the state; and the Louisiana state line by no means limits his reputation. His name is Dr. Julian C. Miller. Until he took the Puerto Rico yam and made it bloom, the development of this tuber was confined to selection. When he succeeded in making the stubborn vine bloom, the first plant scientist to do this, the way was open for controlled crossbreeding. His prize creation is known as "Unit No. 1," by far the most popular yam in Louisiana and other sweet potato areas in the South. Unit No. 1 is the result of eight years of selection from 16,000 plants. Dr. Miller's latest crossbred potato is the *Heart*

(Continued on page 90)

THE PIROGUE, hollowed out of a single tree trunk, is trickier than a canoe. Once the only means of transportation in the bayou country, it is still used by trappers, fishermen, and hunters. There is little current in the bayous, a French name for creek or stream.

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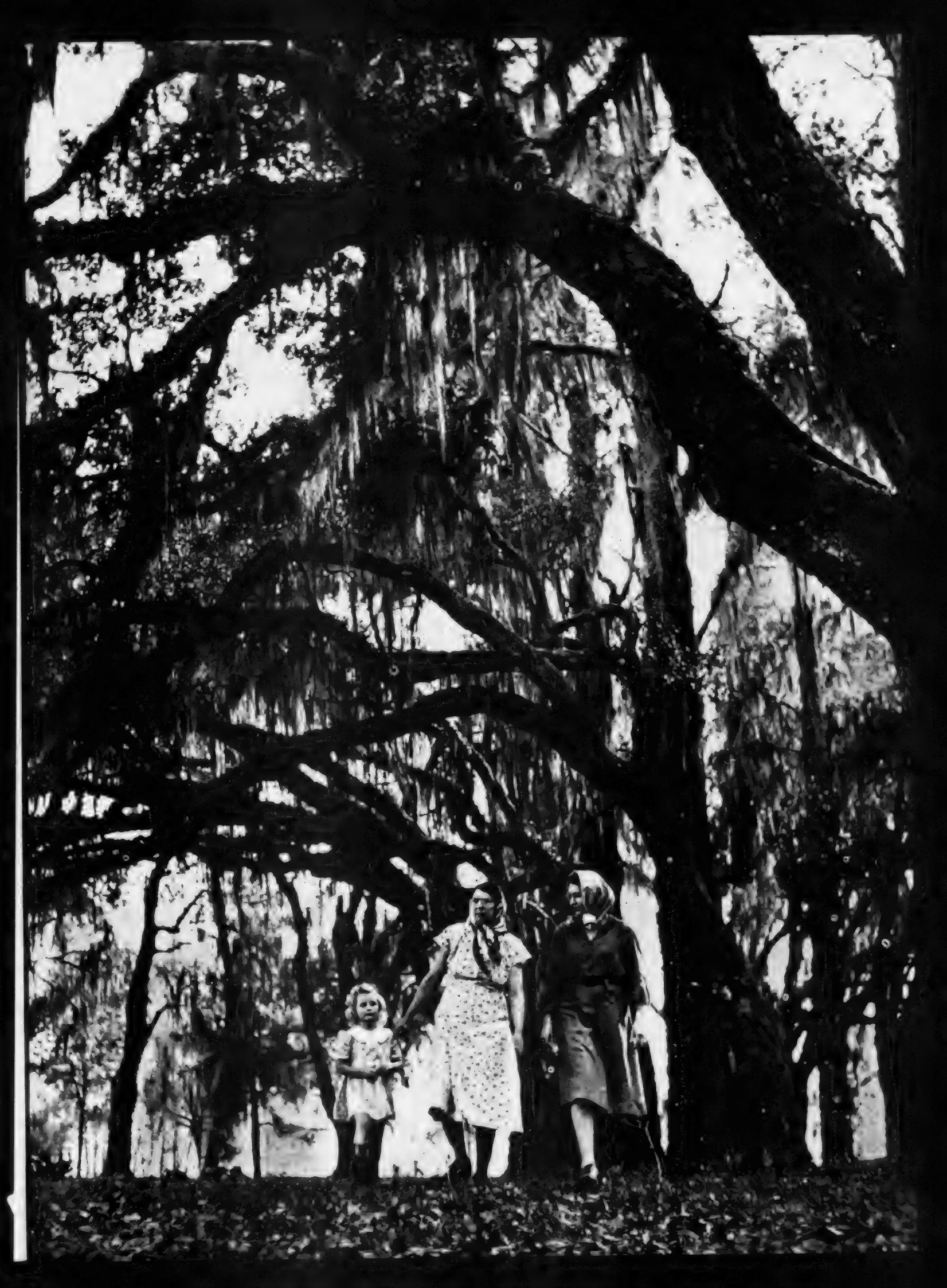
AFTER SUNDAY MASS at Father Barrileaux's church, Mrs. Stelly and a neighbor stroll beneath the moss-covered live oaks on the church grounds. Father Barrileaux is the social and spiritual arbiter for his parish.



IRONING OUT LITTLE PROBLEMS before they can grow and irritate preserves the good relations between Jim Houser and his landlord, Jack Dunlap. They go over the terms of their contract each year and take up day to day problems as they arise. Here they are talking over plans for a fox hunt, an item not covered in their contract.

The Tenant-Landlord Team

BY RUSS CUNNINGHAM

"What I like about my landlord," says young Jim Houser, tenant operator of a 600-acre Ohio farm, "is that he is willing to talk things over. Sure, we have a contract that says what each of us is supposed to do, but there just isn't a contract that can cover everything. So, when we have a disagreement, we sit right down then, before anyone starts feeling huffy, and we talk it over. And after we're through, if we haven't got it straightened out, why durn it, we talk it over some more until we do." Houser comes about as close to stating a formula for good landlord-tenant relations as you will find. His landlord, John Dunlap, Jr., at least, agrees with him that good landlord-tenant relations are largely good human relations.

Tenants, such as Houser, are not the only ones who are concerned about the problem. It is a favorite topic of conversation with farm owners and it is a rare occasion when two of them get together that they don't mull over the problem of dealing with their tenants. One land owner tells the following story to illustrate the importance of the tenant to the farm enterprise:

An Indiana business man, determined to become a farm owner, walked into the office of a farm management service the other day to seek advice on buying a farm. "Have you ever done any farming yourself?" the farm manager asked him.

"No, I haven't, but I've always wanted to own a place," the prospective landlord admitted.

"Do you plan to live on the farm yourself?" asked the manager.

"No I don't," the client replied, "but I plan to get out there once or twice a week so I'd like a place that's pretty close to town."

"Well, I'll tell you what I'd do if I were in your place," the manager advised. "I would look around until I found a good tenant who knows farming and is doing a good job of it. Find one you like and can respect, who has been on one place for several years and knows the farm he operates, likes it, and understands its problems. Then I'd try to buy that farm and get the tenant to go with it." Many will agree that getting a good tenant is as important as buying a good farm.

Types of Tenant Agreements

A great chunk of the nation's farm land, estimated by some to be as much as 40 per cent of all farms with over 150 acres, is tenant operated. The farming of this land is done through an agreement, either written or verbal, with the land owner. Since each agreement is designed to fit a particular farm and its operation, agreements vary widely. In general, however, they fall into four classes: (1) cash renting, (2) crop-share, (3) crop-share and cash, and (4) livestock-share.

Under the cash rent system the landlord furnishes the farm, pays the taxes on it, and pays for upkeep on the farm itself. The tenant furnishes all of the machinery and working capital, bears all

BROKEN WINDOWS COVERED WITH TAR PAPER, a hand pump and outdoor plumbing won't attract a good tenant. It may look quaint from a passing car, but the tenant's wife won't put up with it. And if she won't, he won't.

of the operating expenses, and assumes the whole risk of farming. He pays the landlord a fixed amount, usually on an acre basis, for the rental of the farm. There is little, if any, supervision by the landlord, under this arrangement, except to see that his land and buildings are not abused. The tenant must be in a financial position to swing the whole cost of operating the farm alone, as well as considerable capital invested in machinery, and have the experience that will warrant his assuming the entire risk of farming.

When a farm is leased on a crop-share plan the owner receives a certain per cent of the crop in payment for the use of his land and buildings. The amount of the crop that he receives will depend on the amount that he is contributing to the venture. Where the tenant furnishes the labor and the equipment necessary to operate the farm, as well as half the cost of seed and fertilizer, he usually pays the owner one-half of the crop. The common term for this arrangement is "farming on the halves." There are many variations on this plan. If, for instance, the owner furnishes the machinery and pays for two-thirds of the fertilizer and seed he usually receives two-thirds of the crop. The share that each receives is largely governed by what he has put into the enterprise, though the custom of the area in which the farm is located plays a part too. Under this type of agreement the landlord's return depends on how efficiently the farm is operated and the price that is received for the crop. For this reason the owner usually exercises more control over the operation and usually contributes more of his time and ability in the actual management.

The share-cash system is something of a cross between the straight renting lease and the crop-share plan. Here the major crops are grown on a share basis and, in addition, the tenant pays a rental for other land, such as pasture or garden. This system is used by tenants who wish to carry on a livestock business along with their other farming. Landlords, who do not wish to go into livestock farming themselves, find it advantageous since they can keep a part of their land in pasture and still receive an income from it.

Livestock - share arrangements come closest to being business partnerships of any of the types of agreements described. The landowner, in this case, joins with the tenant in the ownership of all or part of the livestock and the enterprise is operated as a joint affair with expenses divided, as a rule, equally. In the livestock-share operation, as in the crop-share, the tenant contributes his labor and equipment to the enterprise and the landowner contributes the land. They usualy share the income equally, though this may vary with the investment each has in the livestock. Because of the nature of the livestock business, this arrrangement must be based on a long term plan rather than a year to year system such as cash renting.

It would be impossible to state for any year which of these arrangements will be most advantageous for the landlord because of fluctuations in price and all of the other uncertainties of farming, but over a period of years farm-income surveys show that the various share leases bring a greater return per acre than the straight cash lease. Under the cash lease, however, the landlord assumes no financial risk and contributes little toward management. It might be stated as a general rule that in any of the tenant-landlord arrangements the advantage seems to fall to the party that contributes most to the production of the crop and assumes the greatest risk.

Though the variations of the general types of agreement are practically limitless, in each case the landlord is contributing his investment in land and allowing someone else to farm it. In doing this he is taking a risk, for the tenant may turn out to be a poor farmer whose methods ruin the land and shrink the values of his investment.

A Working Agreement

One farm owner who aims to improve his land as well as to secure an income from it is W. Craig Weaver, a city businessman who has invested in a 180-acre farm. "I have lost enough hair worrying about the farm, so that I can now wear both my hair and my name parted in the middle." Weaver says jocularly, "but

the farm has given me a lot of satisfaction and it is a good investment."

Weaver and his tenant, Ray Morling, operate the farm under a typical livestock-share agreement.

"My tenant and I farm on the halves," Weaver explains, "with a crop and livestock program. In the contract we use the term 50-50 to describe our division of expense and income. I don't know what a lawyer would think of such wording, but we both know exactly what we mean and that is the purpose of a contract. Ray Morling came with me six years ago when my last tenant decided to go into business for himself. After the first year with Ray, I knew that I had a good man. We will probably continue to go on together until Ray is in a position to buy a farm."

Weaver met Ray Morling through a mutual friend after Morling heard that there might be an opening for a tenant on the place. Weaver explains that, if you have a good place, there are usually one or two inquiries a year from prospective tenants. If he hadn't met, and liked, Morling, or someone like him, he might have gone to the county agent to suggest a tenant or, perhaps, to the state agricultural college to see if any of the graduating students might want to start this way.

Having met, Morling and Weaver began the discussions that ended in a working agreement that has lasted six years. They went over the 180-acre farm, the buildings and the house. Morling looked over the buildings with a farmer's eye and went over the house carefully with his wife. "The house is a good one," Weaver says, "but I was pleased with the way he looked it over to see if his family would be happy there. After all, if a man isn't interested in taking care of his family, I doubt if he would take care of my property."

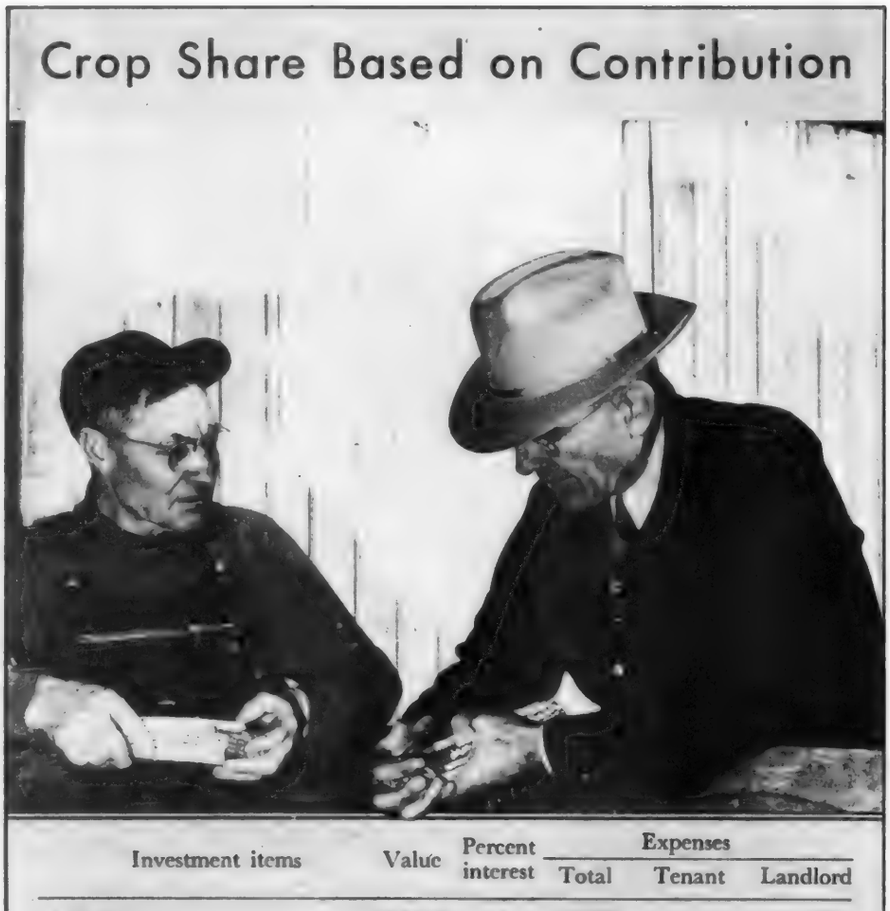
Weaver explained that the subsoil was gravelly, since the farm lay in an old glacial valley. This made it necessary to include livestock in the program in order to return humus to the soil. When Weaver bought the place they had a hard time growing corn because the soil wouldn't hold enough water to bring the crop through. They averaged 25 to 30 bushels to the acre. With a careful manure program they now average 80 bushels with one plot producing 124 bushels last year.

Morling had worked with livestock and owned six dairy cows which he wanted to bring onto the place. Weaver matched the six cows with six others, but they both felt that the bulk of their livestock should be beef animals and hogs. The beef cattle have been bought in equal numbers, but each retains sole ownership of the animals he buys. This came about because Weaver wanted to own registered Shorthorns, while Morling felt that he could not afford to invest in anything but grade stock. When cattle are sold they each sell the same, keeping a 50-50 balance on the farm. They have joint ownership in 14 brood sows and 124 fattening pigs.

THE TENANT'S WIFE is his not-so-silent partner. Landlords know it is good business to keep her happy, for a contented home life makes a contented tenant.

A HOUSE WITH ELECTRICITY, running water and a bathroom keeps the tenant's family happy. It gives them standing in the community and pride in the land they farm.

Crop Share Based on Contribution



Investment items	Value	Percent interest	Expenses		
			Total	Tenant	Landlord
1. Land	$42,000	4	$1,680		$1,680
2. Buildings	12,690	4	508		508
3. Work animals	300	5	15	$ 15	
4. Other livestock	1,890	5	96	48	48
5. Machinery and equipment	3,734	5	187	187	
6. Feed for livestock	960	5	48	24	24
Total interest charges			$2,534	$ 274	$2,260
Other expenses					
7. Management			$ 200		$ 200
8. Operator's labor and management			1,400	$1,400	
9. Unpaid family labor			600	600	
10. Ordinary hired labor			300	300	
11. Cash cost of board			100	100	
12. Purchased feed for productive livestock			152	76	76
13. Depreciation on work animals			20	20	
14. Machinery and equipment depreciation and repairs			810	810	
15. Building depreciation and repairs			600		600
16. Skilled labor (not furnished by tenant)					
17. Fence repairs and depreciation			80		80
18. Machine work hired			100	50	50
19. Livestock expense			152	90	62
20. Seeds and twine			58	29	29
21. Limestone and rock phosphate			200		200
22. Commercial fertilizer			200	100	100
23. Tractor fuel			300	300	
24. Insurance on buildings			60		60
25. Insurance on livestock			50	30	20
26. Taxes on real estate			365		365
27. Taxes on personal property			60	40	20
Total farm expenses			$8,341	$4,219	$4,122

This chart, prepared by the University of Illinois, illustrates a typical livestock-share lease on the halves. Such an analysis of farm expenses and the contribution of landlord and tenant can be useful in checking the fairness of present arrangements, or to adjust the contributions each makes where the crop share is fixed, or to change the crop share to fit the proportion of the contribution each has made. Items, such as the operator's labor, are estimates, but the good judgment and equity used in making them determine the value of the chart.

With this plan in mind they sat down and wrote their agreement. In simple terms Weaver acknowledged ownership of the farm and granted Morling use of the farm and the buildings from March 1 of one year until the next March 1. Morling agreed to furnish all labor for the operation of the farm and also to supply horses, tractors and all other equipment except for stock feeders and water fountains, which they purchased jointly. They further agreed that all hay and other crops should be fed on the farm unless they jointly agreed to sell some of the crop and that all straw and manure should be spread by Morling. The feed that is not raised on the place, as well as the fertilizer and seed, is bought on a 50-50 basis. The milk check and the income from swine sales is divided equally. One acre of land is set aside for a garden for Morling and he has the right to keep 100 laying hens and brood 300 chicks each year without charge for feed.

"We had no renewal clause in our contract, because the state law protects the tenant for a crop year if he is allowed to plant in the fall," Weaver said. "Instead we have a clause that permits me to plant grain in the corn fields in the fall if I wish. Naturally I wouldn't do this unless we were terminating the contract, so it works as an automatically renewable agreement from year to year. The agreement is flexible and we have never held each other to the letter of it. As a matter of fact, the first year I told Ray to keep all of the milk checks instead of splitting them with me. With his investment in stock and machinery he was having rather rough sledding. In a way it was an investment for me, for it helped him get on his feet and if he hadn't done that, I wouldn't have the profitable arrangement I now have with him."

Morling agrees that the working arrangement is good. "A while back," he says, "when corn hit $2.75 a bushel and hog prices were high, we were tempted to sell the whole crop. We talked it over and decided that we wanted to stay in farming together on this place. That means feeding livestock and getting the manure back onto the land if we expect to keep up our yields. So, we went right on feeding the corn and I haven't regretted it. If I hadn't known that I could go on farming here until I'm ready to buy a place, I might not have felt that way about it."

Little Things Count

"It has taken a lot of work and a lot of saving and a good piece of luck," Morling continued, "to get into a position where I could become a tenant. I started farming work for wages. I even worked for a time on a construction gang, but I like farming and wasn't satisfied with any other kind of work. When I had enough saved so that I could get started, I bought a small tractor and tools and began farming for my father-in-law. After a year of

that I heard about a widow who was looking for a tenant on a dairy farm. I had a few pieces of equipment and six cows and $700. We were expecting our first chiid, so I wanted to find a place that I thought would be permanent. You hate to start raising a family unless you can be settled. I jumped at this dairy farm and the owner agreed to let me try it.

"The arrangement didn't work out too well," Morling said, drawing a cross on the ground with the toe of his shoe, "so I won't mention the widow's name. We worked out a good contract and she certainly understood farming, for she had helped her husband with the business of the farm, but she just couldn't sit back and let me run the place. She was over there four and five times a week telling me what to do, criticizing what I was doing, and complaining about everything I'd done.

"I hate to tell you the worst thing that stands out in my mind," Morling said, in answer to a question, "because it was so silly. I had bought a ton of feed in printed sacks and she heard about it. Right away she came over and wanted her share of the sacks. I explained that I needed them to keep feed in and she said that that was my responsibility, but she wanted the sacks. Well, she kept after me for several days until I cleaned out a bin and emptied ten sacks for her. But that didn't end it. She found mouse holes in her sacks and started criticizing me for not watching the mice. Those sacks were only worth four bits, but the way she nagged me about them was one of the things that made me decide to move.

"To run this place," Morling continued, "I have bought a ton and a half truck, a big tractor with cultivators, a smaller tractor, a corn planter, mowing machine, side delivery rake, a three bottom breaking plow, a disc and a drag harrow, a wheat drill, two farm wagons, a manure scoop and a manure spreader, a hammer mill, a ton feed mixer, a corn sheller, a wagon hoist and, with Craig, I own eight hog feeders and four water fountains. I have an arrangement with my brother-in-law to use his corn picker and custom workers do the combining and hay bailing. We split the cost fifty-fifty.

"It has taken a long time to earn enough to buy all that equipment, but we have had some good years and made good money. Now I have saved up almost enough to start looking for a farm of my own. That is what I am aiming at."

In sharp contrast to the profitable operations of Weaver and Morling is the experience of Howard Fain, who owns a 100-acre dairy farm near St. Louis, Missouri, where he keeps a herd of registered Guernsey cows. "Tenants have added ten years to my age," he says ruefully, "and if

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IT COSTS MONEY TO FARM ON THE HALVES and few young men can raise the necessary cash. There is $15,000 worth of machinery in sight here; other items such as hand tools, feed grinders and barn cleaners may add another $1,000 to $2,000 to the bill. This explains why most young farmers must start as laborers or tenants on the thirds.

FROM THE BURMA ROAD, China's back door, American GI's saw age old terraces so well built that Oriental farmers can flood their hillside rice fields without breaking the terrace walls. These step-like bench terraces are the ancestors of our present day channel terraces. Bench terraces are uncommon in the United States. They are used only for high value crops such as grapes, citrus fruits, and avocados.

Terraces divide long slopes into short slopes, stop erosion by slowing down run-off, and conserve water for the use of crops.

Terraces Tame The Runoff

THE first man who scratched a hillside to plant a seed had an erosion problem. His solution might have been a terrace, for terracing is older than recorded history. The Chinese have terraced their sloping fields since the dawn of time: the Inca Indians terraced the mountain slopes of Peru 4,000 years ago. On American farms terracing is being revived for there are no longer new lands to the West that can be homesteaded as old fields lose their top soil. To most American farmers, terracing is a new idea.

Tom Anson of Knox County, Indiana, had never seen a terrace until 1938, when he visited a neighboring county. He knew at once that terraces were a solution to the gulley problem he had on his own place.

Anson owns and farms 212 acres of hill land. His land has been plowed and replowed since Knox County was first settled, and Knox is the oldest county in the state. On the steep fields on Anson's farm, erosion started when the first furrow was turned a hundred years ago. Anson has spent most of his life fighting gullies, but today he is no longer worried about them. "There was a time," he recalls, "when I'd wake up and hear it raining and lie there awake half the night worrying about my soil going down the Wabash. Now if the rain wakes me up, I just roll over and go back to sleep."

Anson's sleep is untroubled now because a complete system of terraces conduct rainwater from his fields in an orderly manner. As an extra check on erosion he includes plenty of grasses and legumes in his rotations.

When you look across one of Anson's terraced fields you see a slope interrupted by bands of wide shallow ditches that wrap themselves around the hill. The ditches have a water channel, 16 to 20 feet wide, which is no barrier to farm machinery, not even a combine. Like the rain gutter on a barn roof, the terraces carry water off to one side of the field and spill it safely rather than let it run broadside down the hill.

Anson's terraces are a part of a half million miles of terraces which have been built throughout the country. The Soil Conservation Service, planning with farmers, are looking forward to increasing this to a million and a quarter miles. Much of this terracing is in the South, but slopes in the Midwest and the Great Plains are also being altered by these man-made ditches.

Terraces do their work by breaking a long slope into a series of short ones. They are especially valuable on long, gentle slopes. Water gains speed as it rolls downhill. The longer the slope, the faster the water is moving as it nears the bottom of the field. The faster water moves, the larger the particles of soil it will carry. Water rolling down a slope at a speed of four feet a second can carry 32 times as much soil as it does at only two feet per second: if the speed is again doubled, to eight feet per second, its carrying capacity is increased 1,024

THE DISC PLOW is a good terracing tool. On trashy fields it cuts a slice without sliding from side to side, which is one objecton to the moldboard plow. The best time to terrace is in spring or autumn when the field is being plowed.

WHIRLWIND TERRACERS run from the power take-off, and throw soil several feet from a rapidly revolving auger. On a heavy duty tractor they can build a mile of terraces a day. Because of the cost, farmers often own them cooperatively.

times. Since water doesn't cross the ridge of a well built terrace, the length of the slope is the distance between terraces rather than the distance from the top of the hill to the valley below. Run-off is slowed down and tamed.

Anson tried all the old tricks to stop the escape of his top soil before he learned to terrace. "My father was always worried about erosion," Anson says, "and while I was still a kid he taught me how to choke up ditches with straw. But every year the straw washed out and we'd have to go back and do the job all over again. That took a lot of straw and a lot of work, and even then we lost soil. Now we don't have to stop the gullies," he points out, "because we don't let them get started." Building up the fertility of his 212 acre farm has been a slow process for Anson. He has had to be a doctor to his fields and the cure for worn out land is slow and unspectacular.

"I was just five years old," Anson recalls, "when we moved onto this place. My father bought a 25 acre patch which is now about in the middle of the farm. To get here we traveled 25 miles in a wagon. At first we lived in a one-room shack with a lean-too kitchen. There was an old log barn for the stock. Three years later, my father bought another 23 acres."

Seven times within Anson's memory additional land has been bought and tacked onto the farm. "The new fields always needed a lot of doctoring," he said. The last addition to the farm was a 40 acre piece formerly owned by a neighbor woman. "She knew it was in bad shape," Anson explained. "After the Soil Conservation people told her what it needed she figured there just wasn't enough money in the world to fix it up." The next day she gave it to her son, and he sold it to Anson. That was in 1942 and by that time Anson understood terracing and other soil conserving practices well enough to feel that he could bring the field back into good production. "It hadn't grown a crop of corn for 15 years," he said. "This year I took off from 60 to 70 bushels of corn to the acre."

It was in 1938 that Anson took a trip into the next county and saw his first terracing at a county demonstration. He recognized it as something his farm should have, and when he returned to Knox County he contacted the local office of the Soil Conservation Service for help.

Soil Conservation field men came out and made a complete erosion control plan for Anson's farm. They were ready in short order to start transferring the plan from paper to the land. Without cost to Anson they brought in surveying equipment and laid out the contour lines where the terraces should be built. A self-propelled road grader was brought in to move the soil.

Anson knew he had started something new in his section when word of what the neighbors thought about terracing started to trickle back to him. "There was quite a bit of snickerin' among 'em," he said. "Takes a while for a new thing like that to catch on. There is one farmer around here who bought a farm that was pretty well terraced. He tore the terraces down. Now he's building them back again."

The conservation practices chosen for a farm must fit the farm. Terraces will not increase soil fertility. When combined with proper cropping practices, however, they will help hold top soil, save valuable seed and give crops a chance to bind the land and increase its fertility.

Terracing got its big boost when it was learned that a farmer could build his terraces with the machinery he had on the farm and need not hire expensive large equipment, such as the road grader that Anson first used. Today most of the farm terracing is done with tractors and moldboard or disc plows. There are also some new special terracing machines being built. One is a large single or double disc that is attached to either the side or rear of the tractor. This is the machine that is popular where light tractors are used. They will work trash and straw into the soil without "balling up." Another new machine that is popular where farmers can pool to purchase it is the whirlwind terracer, which throws soil from a rapidly revolving auger. It runs off the power take-off, and with heavy tractors is a speedy way to build terraces.

The first requisite for a good job of terracing is thorough and expert planning. This is the job of the Soil Conservation Service. Terraces poorly planned and constructed can speed up the erosion of top

soil rather than help hold it in place, and terracing is not always the best erosion control. If a field has a slope of more than 12 per cent the cost of adequate terracing would seldom justify the results. Slopes of 12 to 25 per cent that must be farmed should be in permanent pasture or else contoured and strip cropped. If the slope is greater than 25 per cent it should generally be in forest. Some fields have slopes so gentle that contour cultivation will control the erosion and on these fields terracing is unnecessary. But, where rainfall is plentiful, as it is throughout the Midwest, or the soil is especially erodable as it is in much of the South, or where rotations must be short, terracing does the job.

Modern terraces are divided into two general classes. In the Southwest, where water is at a premium, ridge terraces are built broad enough to absorb much of the rainfall. In regions of heavier rainfall, channel terraces are designed to carry excess water from the fields. Bench terraces, which turn the slope into a series of steps, are seldom used, since they are profitable only where high value crops, such as grapes, are cultivated.

The Waterways

The first step in laying out a system of terraces is to figure out where the water is going after it empties from the ends of the terraces. If the terraces can be located so they empty onto a permanent pasture the problem is simple, for the sod will protect the soil. If the water must be carried off through cultivated fields, grass waterways must be established to keep the water from making gullies in those fields. The simplest system that will carry the water safely is usually the best. The waterways vary from farm to farm. In some cases the water can be directed into creeks or highway ditches. It should not be allowed to run down lanes or field roads or down old gullies, for these strips of land are hard to protect from washing.

In no case should terraces be built until there are adequate waterways to serve them. Soil Conservation Service field men point out that probably more failures in terracing develop from poorly planned and maintained waterways than from any other factor. Unless the waterway is protected by forest cover, a carpet of grass or other vegetation, the increased load of water which the terraces pile into it will turn it into a gulley, and eventually the gulley will eat its way up the slope and back along the terraces.

For the farmer who has always kept his waterways in grass and not plowed or cultivated across them, the problem is not too difficult. He already has a network of green fingers reaching back across his terraces. If the sod is thin on these waterways, however, the strips should be reseeded and fertilized liberally.

Terraces up to 1200 feet in length can be built so that they slope in one direction and all the water empties from them on one end. Longer terraces, however, should be constructed so they slope gently toward the middle where the load empties into a grassed waterway or with a high point in the middle so they empty from both ends.

When the drainageways are in working condition the actual terracing can start. If more than one terrace is to be constructed on a slope, and this is usually the case, the top one is built first. If the bottom one were built first it would have to carry water from the entire slope above it in case additional terraces were not finished before the next rain. This could ruin the terrace.

The job of figuring out where the terraces should be constructed requires two men. Usually the field man from the Soil Conservation Service computes the degree of slope and figures out the contour lines with his level, while the farmer goes ahead and drives short stakes to mark the path of the terrace. Farmers with engineering experience have laid out their own contour lines for terraces, but most farmers, like Anson, rely on the experts to help with this chore. The first terrace should be established close enough to the top of the slope to guarantee that it will carry its load, for if water flows across the ridge of the first terrace it puts added work on those below and the whole group may be destroyed.

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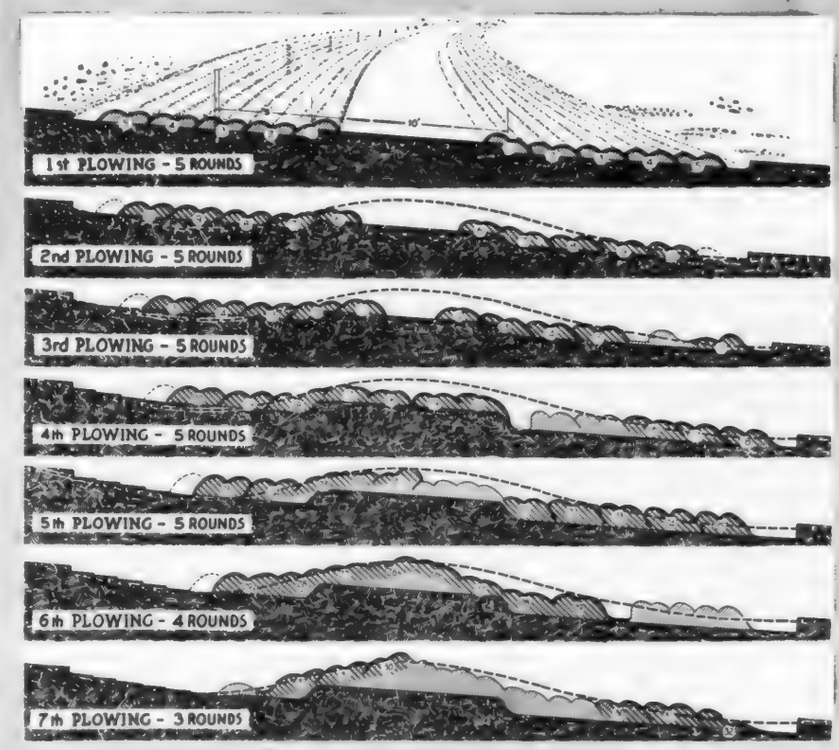
How To Build A Terrace


1st PLOWING - 5 ROUNDS
2nd PLOWING - 5 ROUNDS
3rd PLOWING - 5 ROUNDS
4th PLOWING - 5 ROUNDS
5th PLOWING - 5 ROUNDS
6th PLOWING - 4 ROUNDS
7th PLOWING - 3 ROUNDS

THIS IS THE TYPE TERRACE that Midwestern farmers are building around their hillsides with their own tractors and plows. The first furrow is thrown down-hill five feet below the line of stakes. The second furrow is thrown up-hill on the return trip 15 feet below the stakes. The locations of the first two furrows are best determined by two men carrying a measuring rod or string between them. One walks along the line of stakes, and the other walks in front of the tractor. This method of terracing, with small machinery, was developed by the Soil Conservation Service.

ORIGINALLY bred as a dual purpose farm animal, the Walking Horse is now popular in the show ring. Maid of Cotton, left, is a show horse owned by Jack Slayden, Holly Springs, Mississippi. Opposite is the Walking Horse which Harlow Walker, Gambier, O., rides to check stock and fences.

The Walking Horse

BY PAUL DE LOTT

FIFTY YEARS AGO, the farmer's most important possession, next to his wife perhaps, was his horse. The horse supplied his power and his transportation. He needed an animal that could work under the saddle or in the harness. The horse that would safely carry any member of his family on his back, or take them all to church in the surrey on Sunday, and during the week worked in a team at the corn plow, was a premium horse on any farm.

There are still horses on 60 per cent of our farms although tractors have edged them off the larger ones. On many small farms there is still a place for a medium sized, multi-purpose animal. The old general-purpose horse, an animal with some thoroughbred trotting blood and perhaps a bit of Morgan is, in many places, being eludes all the shades horses wear. Walking replaced by the Tennessee Walking Horse, a relative newcomer that is gaining favor because he is gentle and rides like a rocking chair. In addition, the Walking Horse works well in harness. On a Walking Horse children and timid riders are as safe as if they were in God's pocket.

Walking Horses are flashy animals. They have a wide range of color that in-Horses may be black, chestnut, bay, blue or strawberry roan, palomino, pinto, or mixtures of any of these colors.

The Walking Horse stands about 15½ hands or 62 inches high at the shoulders. He weighs from 1,000 to 1,400 pounds, which makes him slightly larger than a Morgan Horse.

Under saddle a Walking Horse has the habit of nodding his head, as though approving every step he takes. He may also grit his teeth for no apparent reason, but his nodding head and gritting teeth, as well as his gait, help identify the breed.

On large farms and plantations in the South the Walking Horse has long been a favorite for carrying owners and overseers where an auto can't take them. The horse is easier to start, doesn't bog down in mud holes, and the rider doesn't have to get out to open gates. On many farms the horse is a luxury kept by the farmer for the same reason he keeps a dog. He likes to have animals around. There has been money made on Walking Horses, but this coin was mostly collected by horsemen who had a flare for showmanship, a love of horses, a keen business sense and the spirit of the gambler. To others the presence of the horse is justified if he looks pretty and provides pleasure. A Walking Horse does both.

Most Walking Horses in the country trace their ancestry back to Black Allan, a pacer sold in 1891 in Elyria, Ohio, to a horseman by the name of Mankin of Rucker, Tennessee. Mankin bought Black Allan for harness racing. He had great hopes for the black stallion's future on the race tracks. The dream might have materialized except for thing; Black Allan

(Continued on page 126)

A GOOD Walking Horse will help his rider open a gate without dismounting.

THE COMBINE PARADE

The combine was born in Michigan in 1834; it migrated to the West Coast and returned to the Midwest eighty years later to reduce harvest labor to a routine job.

By F. HAL HIGGINS

MRS. JOHN HASKALL had a dream. As she plied her husband with flapjacks on a summer morning in 1834, she told him about it. The day before she had heard her men folk discussing how to plant and harvest wheat from 20,000 idle acres that lay about their Michigan homestead. She had seen in her dream a large machine, drawn by horses, going over the wheat fields, cutting and threshing the grain.

That afternoon Hiram Moore, a neighbor, called on the Haskall's. Moore was an ingenious person with an inventive turn of mind. From Mrs. Haskall's description he drew a rough sketch of the machine and that winter made a model. He took this to Washington and obtained a patent. The combine was born.

The combine is a machine which cuts, threshes and cleans grain in one operation in the field. It saves the labor of many men, it saves crops, and it gets the job of threshing done in a hurry. It is called a combine because it is a combination of a reaper and a thresher.

The father of the combine was the reaper, which cut the grain. Its mother was the thresher, which separated the grain from the straw and chaff. The wedding of the reaper with the thresher was a natural union; both were in their very early stages of development when the idea occurred to men that if they could be combined, placed on wheels, and pulled around a field of grain, a vast amount of human sweat and labor could be eliminated. The inspiration for the combine was the need for more bread for growing populations.

The Gauls, those people that gave the old Romans so much trouble, had the first idea on the combine about 1700 years ago. Their contribution was a "stripper," pushed by a bullock. This crude implement stripped off the heads of the wheat. The threshing was done as it had been done since time immemorial—

THE MEN AND MACHINES of the "Harvest Brigade" which jumped off in Texas at the beginning of the 1948 harvest and followed the ripening wheat to the Canadian border. These twenty-seven men, from cook to master mechanic every one a specialist, harvested thousands of acres. An army of men with scythe and flail could not have kept pace with the Harvest Brigade. And farmers' wives welcomed the sight of the cook wagon and diner.

A FIELD THRESHER frames Mt. Washington, making its last stand against the combine. The time element, labor shortages, and the need to return straw to the soil are sending the threshing outfits to the junk heap after more than a century of service.

THIS MODERN self-propelled, one-man combine shows two trends in construction, the auger table and the windrow pickup.

tramped out by the feet of animals or humans, or beaten out with flails.

The first mechanical threshers were simple water or wind-driven revolving drums which beat out the grain from the sheaves. The ingenious Scotch first used animal operated treadmills 115 years ago on their threshers. Here in America Cyrus McCormick made the first reaper in 1831. About 1841 the Australians began the development of their simple and efficient stripper outfits which they call headers today. From these crude beginnings, and others like them, grew the combine.

This development was hastened by the complexities of the world wheat market and labor shortages as well as the need for more wheat to feed the growing urban population of the world. To get to the big markets, California wheat had to be shipped around the Horn. A way to harvest wheat more cheaply had to be found to keep the West Coast farmers happy and prosperous. As the "bugs" were taken out of the reaper and the thresher and they became standard farm equipment, ingenious men turned their talents to ways and means of combining them. From 1835, when the first crude combine was built, until 1880 when factory production started, combines were custom built by mechanical-minded farmers who then operated them on their own or neighbor's farms.

The first machines were built in the Midwest, but the industry quickly migrated to the West Coast where the immense wheat fields gave them more elbow room and the climate permitted their immediate success. Combines did not return to the place of their birth until 85 years later.

The Dream Machine

During the winter of 1834-35 Hiram Moore took his model of Mrs. Haskall's dream machine to Rochester, New York, to the famous Hall factory, where many of the successful threshers were made. From the parts the Halls turned out for him he made his first combine. At harvest time in 1835, at Flower Field, Michigan, he took this into the field for a trial. He cut two rods when something broke. During the next year he built another machine and induced a neighbor to let three acres of his wheat stand for a field trial. Drawn by 12 horses, it cut and threshed the three acres in good order. According to Moore's figures it cost 82 cents per acre to thresh, in contrast to a

cost of $3.12½ per acre by the old way, reaping and threshing.

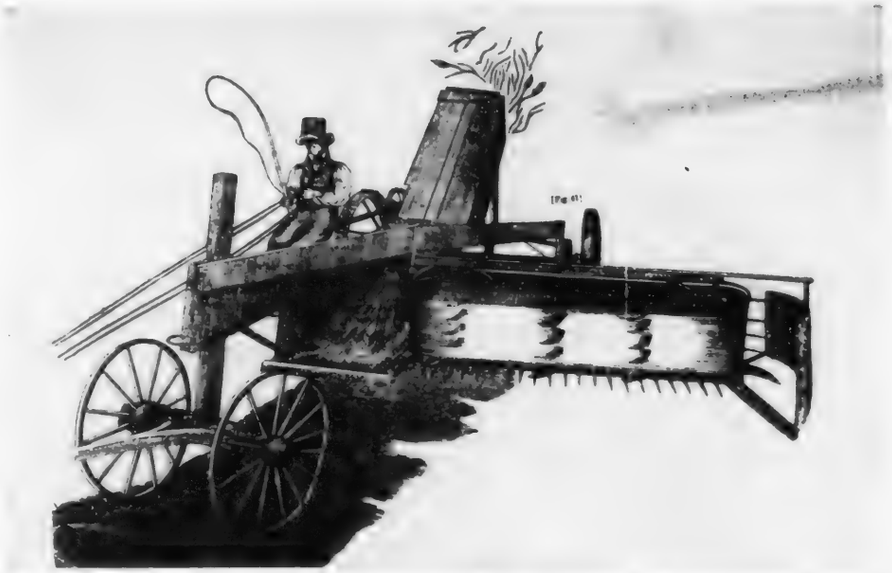
These first machines built by Moore were wonderous contraptions. Power for the threshing and cutting was taken from two enormous drive wheels, heavily spiked to prevent slipping on wet ground. A barrel-like cylinder set at an angle separated the grain and the chaff and spewed the straw out its open end. Its most important feature was a "slotted finger" cutter guard, the first good sickle made and the forerunner of our modern sickle. It also boasted a clutch. The grain and chaff fell into detachable boxes which were hauled away by wagons to one end of the field and winnowed. It was full of gremlins, and teamsters got frequent rests, while belts, reels, and gears were repaired.

The next year a few kinks were taken out and in 1837 it cut 20 acres. In 1841 Moore added the angle sickle which, it was said, "worked all through harvest without being ground." The angle sickle was essentially the same type of sickle we have today—a series of triangular knives running through guards. A later Moore model drawn by 16 horses hitched two abreast cut a swath 10 feet wide, doing 25 acres in a day. It cleaned the grain; a sacker rode on a platform and dumped the sacks off as he tied them.

Moore and other machine makers carried on a series of law suits during the years the combine was growing up. When a new machine appeared in the fields, swarms of spies from other factories hovered about, and when they saw an improvement or a new workable gadget that looked practical, they hot-footed it back to make a copy. Patent office records confuse rather than enlighten; and there was no end of politics tied in with the birth pains of the new machine.

In 1853 A. Y. Moore of Kalamazoo (no relative of Hiram) bought one of the five machines which Hiram had made by this time. He sold an interest to George Leland, a neighbor, and the partners shipped it to California via New York and around the Horn. A son of A. Y. Moore, Oliver Kidwell Moore, and Moore's partner, George Leland, crossed the plains with horses and a crew, picked up the combine in San Francisco, and operated it during the harvest season of 1854, near Mission San Jose, California. Here it harvested 600 acres for the leading wheat farmers in this area on the edge of San Francisco Bay. Among these farmers was John M. Horner, a wealthy ranchman, who ordered wrought iron fence from England to enclose his estate, and was willing to try anything once. Moore's machine was idle in 1855, but in 1856 Leland's son put it in the field and, not being skilled in machinery, neglected to oil it. One of the bearings caught fire and it burned.

(Continued on page 94)



THE BRIGGS & CARPENTER COMBINE, which Briggs financed and Carpenter invented at Ft. Covington, Ky., in 1836. It was demonstrated in up-state New York the same year.

A SHIPPEE COMBINE of 1884 vintage, pulled by 21 mules, is posed with the proud family of the owner. The group includes the five man crew and mother in a new bustle.

A RANCH-BUILT, PUSHER TYPE COMBINE of the late 1870's. The owner, M. M. Atwater, Merced County, Cal., bought thresher, header and cleaner separately and combined them.

TOP:

FIVE HOLT COMBINES in Drumheller's wheat field near Walla Walla, Wash., in the Gay Nineties. There were 165 head of horses and mules on the five outfits. Tourists sent thousands of post cards of this scene, in color, back East.

CENTER:

AN EARLY SELF-PROPELLED Holt combine in a Washington field in 1909. Some of these ponderous machines were in operation as late as 1929. Labor was plentiful and the crew was as large as on the pull or push giants. These wooden jobs were fire hazards.

BOTTOM:

THIS BERRY MACHINE, a home made job, steam powered, was a sensation of the 1880's because of its wide cut. Berry added a little each year, reaching 40 feet in 1888. On rough ground the end reel usually dropped off.

TOP:

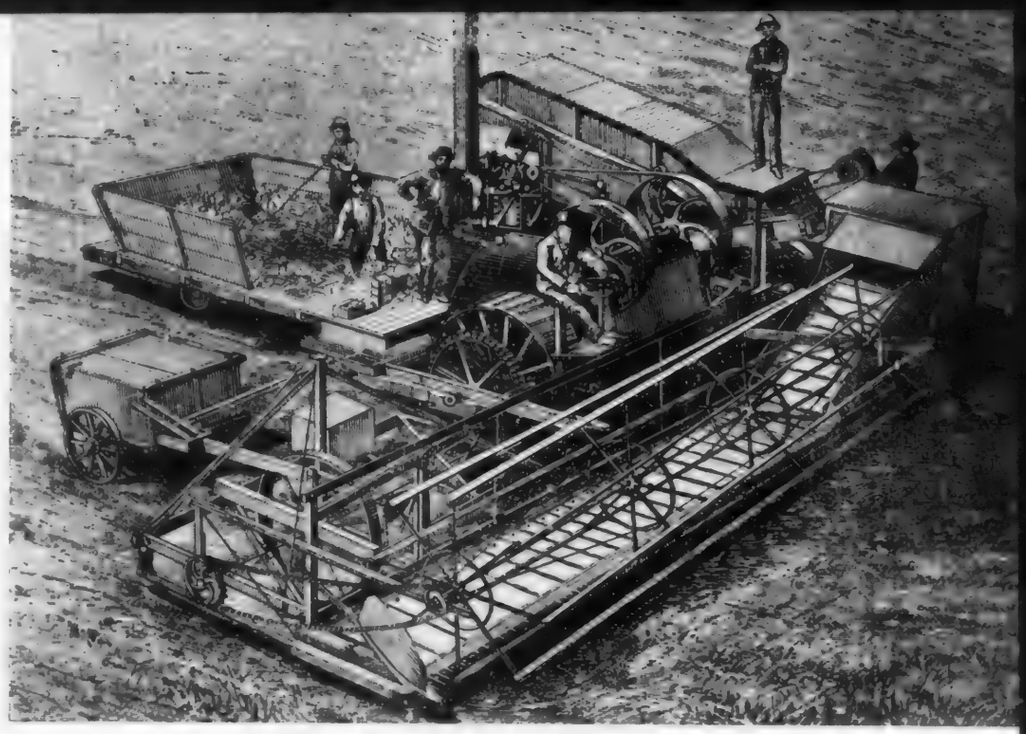
GEORGE BERRY'S MACHINE included many firsts in power machinery: first straw-burning combine, first steam-driven, first self-propelled, first portable threshing engine made by a farmer into a tractor to power a combine, first to operate in reverse.

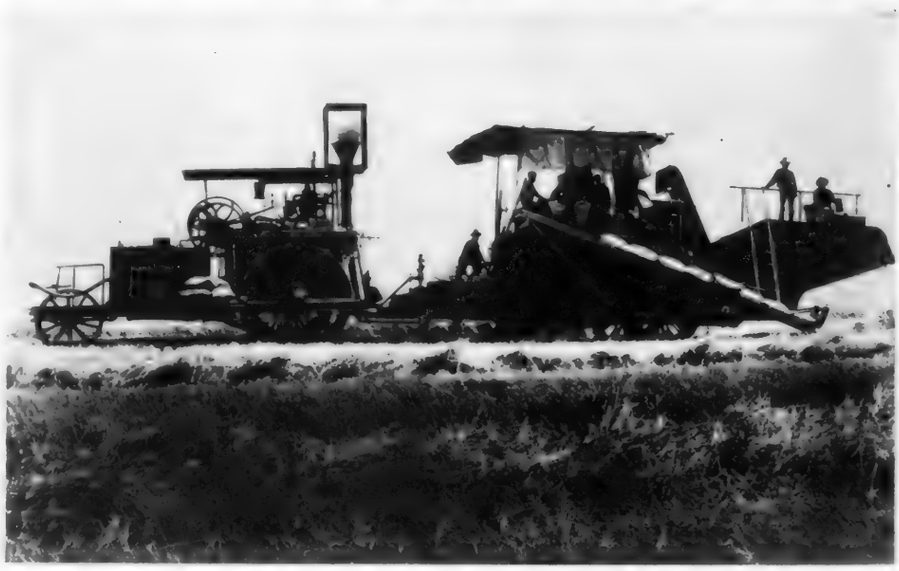
CENTER:

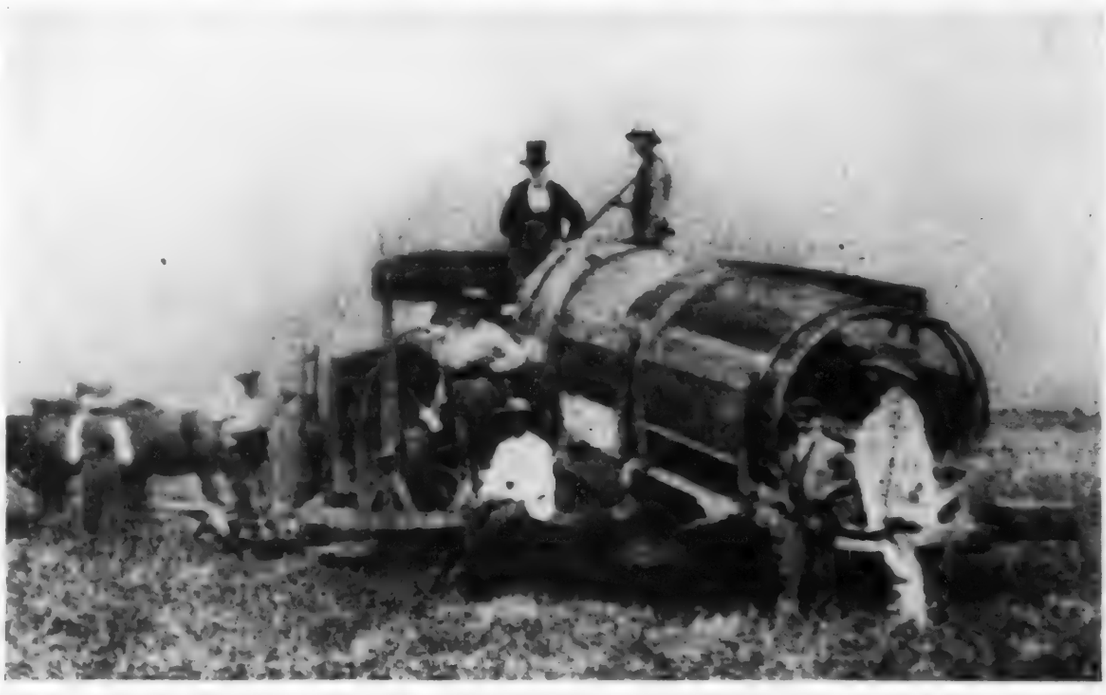
A HOLT OUTFIT showing how steam was taken from the tractor to power an auxiliary engine on the combine to operate the threshing, cleaning, and elevating parts. Note the coal sacks on the tractor and the straw elevator.

BOTTOM:

THE GRANDDADDY of them all, the Hiram Moore (in high hat) machine in West Michigan about 1850. Later he took this machine to Wisconsin where there were bigger wheat fields. He used it every year until his death in 1875. Each team had a separate driver.







GRAIN GRADING

BY GRANT CANNON

The country elevators determine the grade and set the price of the farmer's grain. They use the government standards as a measuring stick for grading; the Chicago market influences their prices.

AT the Brundige Elevator in Kingston, Ohio, or at almost any country elevator during the hot July days, you will see a block-long procession of farm trucks loaded with wheat. The line moves slowly forward in truck length intervals, as the lead truck pulls onto the scales to be weighed and have its load checked. Drivers waiting in line get out to stretch and to talk and joke.

"What have you got there, Jim, a load of cockle," one driver calls out.

"Why I don't know for sure, Bill, but it looks like wheat, and smells like wheat, and the pigs broke into it and they thought it was wheat, so it might get by Brundige as a load of wheat."

"What are they offering today?"

"I got two fifteen on my first load."

A truck pulls off the scales and heads toward the dumping hoist and an empty pulls on to have the truck weight recorded. When the scales are balanced, the weighman, Ken De Long, fills out a ticket showing the weight of the wheat delivered, the grade assigned to the wheat, and the price paid for the load. He gives the ticket to the driver who makes way for a full truck to pull on the scales.

Tested And Sold

"Hi there, Mr. Borders," De Long calls to the driver, George Borders, whose 300 acre farm lies a mile down the red brick road that leads out of town. "Looks like you've got a pretty good dab of grain there."

"I'll say it's good," Borders replies. "You'll probably be selling it for cleaned seed."

De Long weighs the new load and climbs onto the truck with his test bucket and weighing beam and, if it is a deep bodied truck, a grain probe. He pushes aside the top grain that has been cleaned of chaff by the wind, and fills his bucket from the lower level. He levels the grain in the bucket carefully and hangs it onto the weighing beam to find the test weight of a bushel. This is the first vital step in assigning a price to the load and Borders watches with the interest of a man about to lose some real money. If the weight doesn't quite come up to the 58 pounds per bushel that will permit a No. 2 grade, De Long may make another test or two to be sure.

De Long then buries his face into the grain and sniffs it to see if it has a garlic or smut odor. Grain that has been stored may also have a musty smell, but at harvest time this is rather rare. "I can usually tell," De Long says, "whether there is any garlic or smut in the grain when I walk up to the truck, but I always check to make sure."

De Long jumps off the truck with his pail of wheat and carries it into the office for a moisture test. Borders follows along, commenting, "Now that you know I've got good heavy wheat you'll cut my heart out with that swindle box of yours."

The "swindle box" is an electrically operated device that tests the moisture in the grain. The wheat is poured into the hopper and, as it is turned through, a needle dial indicates the electrical resistance the grain causes. The drier the wheat, the greater will be its resistance to the electric current. A chart is then consulted which converts the resistance number along with the variables, such as inside and outside temperature, into per cent of moisture. To be graded into any of the five grades of wheat the moisture must be 14 per cent or less. If it contains between 14 and 15.5 per cent moisture it will be placed in one of the numerical grades and marked "tough." The farmer is docked around 2½ cents for each half of a per cent of moisture over the 14 per cent limit. If the wheat is so wet that it would be unsafe to store or ship, it has to be put through the dryer, which is expensive and adds to the discount. "It stands to reason," says R. H. Brundige, the operator of the elevator, "that we can't afford to buy the water in wet wheat and pay to have it extracted. We have to dock the farmer for poor quality or we'd lose our shirts."

The Brundige elevator usually makes no dockage check for chaff, weed seeds or other grain in the sample unless De Long

BURYING HIS NOSE in a pan of wheat, the grader can detect the slightest smell of garlic, smut, sourness, or objectionable odors from storage. If he gets a whiff of any of them he will spread out a sample to determine the extent of the damage.

TEST WEIGHT PER BUSHEL is determined with a standard bucket and scales. If it is a fraction below grade weight, he will usually dig in for another sample to make sure. The top wheat may be heavier if the wind has cleaned it of chaff.

sees that the load is particularly dirty. "The farmers around here have been sowing cleaned seed for so long that we don't have much trouble that way," Brundige says. "If we get a dirty load we check it. To do this, you pour 250 grams of wheat into a set of sieves and shake it through. The top sieve lets the wheat through and holds back larger stuff; the middle sieve holds the wheat and lets the small particles pass through. Some wheat-sized dockage, like cockle seed, you will have to pick out by hand.

"As I said," Brundige continued, "we don't have much trouble with dockage here, but out West it is usually a big headache. There they use an automatic machine, a dockage kicker it is called, to separate the dockage. Incidentally, when you check the dockage you weigh the wheat for its test weight per bushel after the dockage is out. The per cent of dockage is measured by weight and that is the per cent the wheat will be discounted."

When the grading is completed the bushel price can be set for the load. This price and the daily price posted by the elevator are based on No. 2 grain prices on the Chicago Exchange at the close of the previous day. No. 2 wheat must weigh between 58 and 60 pounds a bushel and have less than four per cent damaged kernels, five per cent foreign material, and 10 per cent wheat of another class. If the load grades better than 60 pounds to the bushel, tests less than 14 per cent moisture, and has no appreciable amount of dockage it will grade No. 1 and be given a premium, usually one cent. If the wheat weighs out at less than 58 but better than 56 pounds to the bushel it will fall into No. 3 grade and a discount of three or four cents will be made on the standard, No. 2, price. No. 4 wheat weighs between 54 and 56 pounds, and No. 5 between 51 and 54 and each receives a proportionately larger cut in price. Wheat that is over the limit on moisture, that is, over 15.5 per cent, or is musty, sour, or heating, is classed as sample and is penalized, but in line with its condition.

When the grade has been set, Borders drives his truck off the scales and back to the elevator. He drops the tail gate and a hoist lifts the front end of the truck to let the grain pour out into a chute. Borders then takes the empty truck back to the scales for weighing, picks up his ticket, and drives back to the farm for another load. The wheat he delivered is elevated through the legs of the elevator to the bins above for storage until shipment. "We try to keep the different grades separated," De Long explains, "so that we can get the best grades on it when we ship. We are especially careful to sidetrack any of the sample grade wheat that might ruin a good carload. There are times though, when you're under the gun with your bins loaded and the wheat pouring in, when you have to load directly onto the railroad cars. A grain man down the line was telling me that he got caught that way last year and had to load the good and the bad and the indifferent all into cars. He said that he didn't get better than a No. 3 grade car the whole season even though he'd taken in a lot of No. 2 wheat."

The Elevator Must Sell Too

Once the grain goes down the chute into the elevator and the farmer receives his slip showing the amount and price of the grain it becomes the country elevator operator's job to dispose of it. Each morning he receives cards from the terminal elevators and from grain brokers giving him their current price on grain. The price is always based on the closing price of the Chicago Exchange of the day before and is in terms of No. 2 grade whether it is on wheat, corn, oats, soybeans or any other grain. During the day Brundige will get calls from the buyers who keep him informed on the price fluctuations and their current offers. If there is a severe break in the market, either up or down, he may change the price he is offering the farmers, but minor variations won't affect his offer. He sells grain to the buyers who phone him, when he thinks their offer is the best he can get.

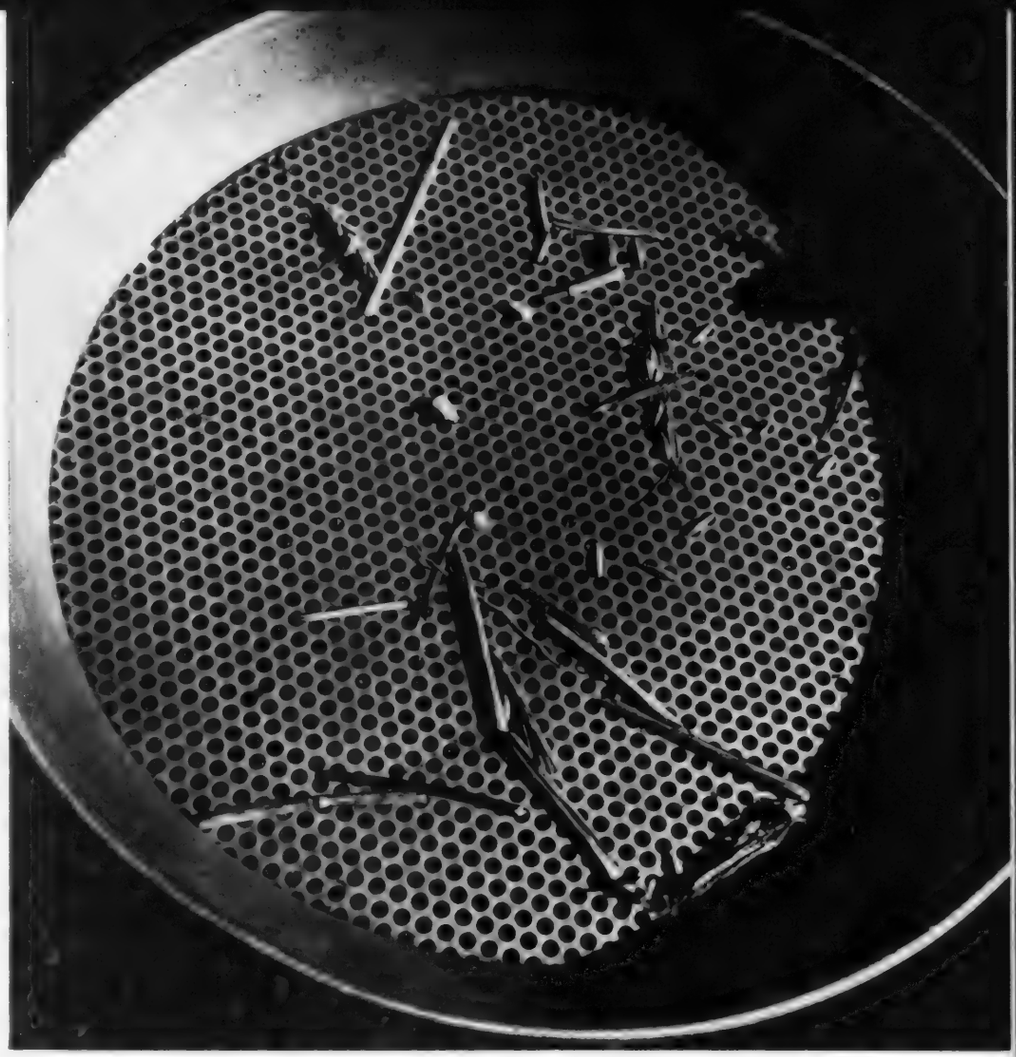
This is the usual procedure for all country elevators. The terminal elevators and the grain brokers watch the market, the supply, and study the demand of their customers and make a bid on the grain at a price they feel they can afford and still make a profit. The country elevators then make their offer to the farmer leaving themselves a margin to cover the cost of handling, cleaning, drying and loading the grain. The country elevator operator may also take into consideration the crop in his area. If there is a big supply and if he has no competing elevator buying grain he may take as high as a 12 to 15 cent margin on a "bearish" market. If the supply is short, or if a competitor is making attractive offers to the farmer, he may have to cut his margin to as little as three or four cents a bushel. Another factor that keeps the country elevator operator from taking too large a margin is the willingness of the Commodity Credit Corporation to give loans or make purchase agreements on grain at 90 per cent of parity.

If the elevator price drops below this figure, the farmers will turn to the government and secure a loan or make a purchase agreement.

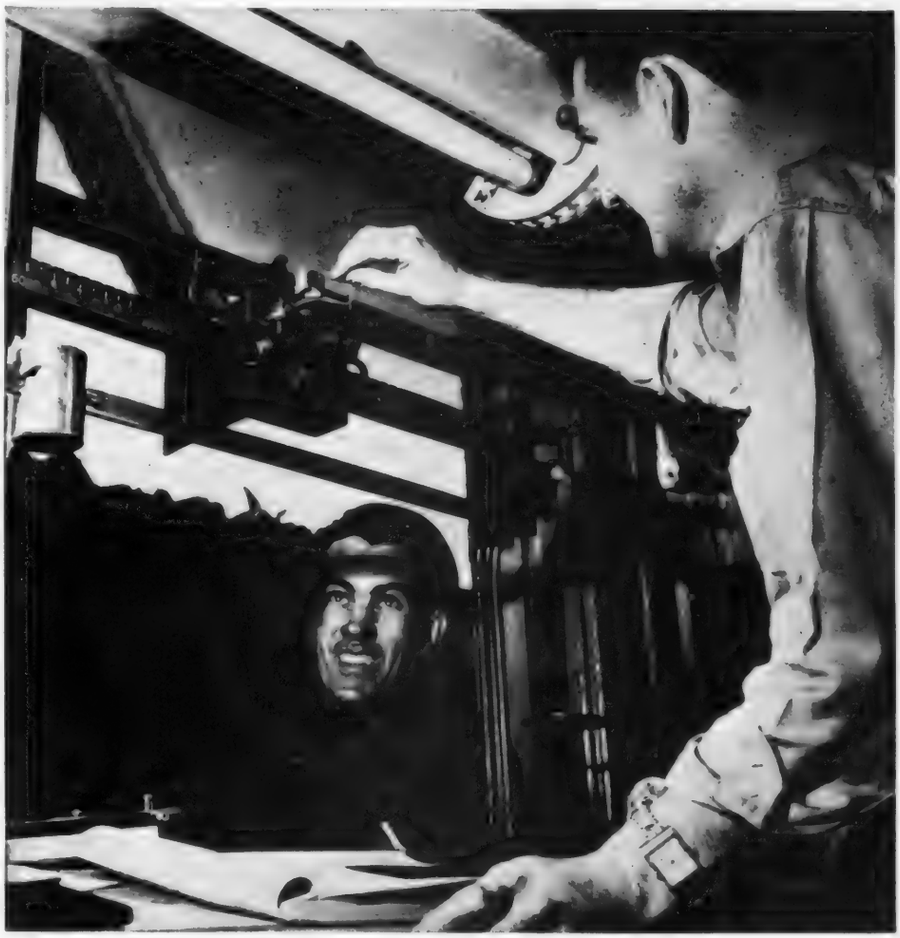
"There's not a more reliable bunch of men in American business than the grain people," Brundige says, with a little truculence because of the way his colleagues have sometimes been pictured. "We buy and sell on verbal orders over the telephone. We both confirm the orders in writing when we hang up, of course, but I may have the car of grain loaded and on the way before I have a word in writing from the buyer. When the car is loaded and sealed I get the station agent to sign the bill of lading and the sale is complete. I can draw a draft on the papers. The draft I draw on the shipment will be about ten per cent below the offered price because the offer was on the basis of No. 2 grain and I can't be positive that my carload will grade that high.

"This same process of grading, buying and selling applies to wheat, corn and soybeans," Brundige remarks. "We probably emphasize wheat a little because we do more business in wheat than in the others. With corn, about our whole concern is with the moisture content. We never bother with a test weight per bushel and, if the husks aren't so bad that you can still tell the color of the corn, we don't try to weigh the dockage. We figure all corn that comes in from September to the first of

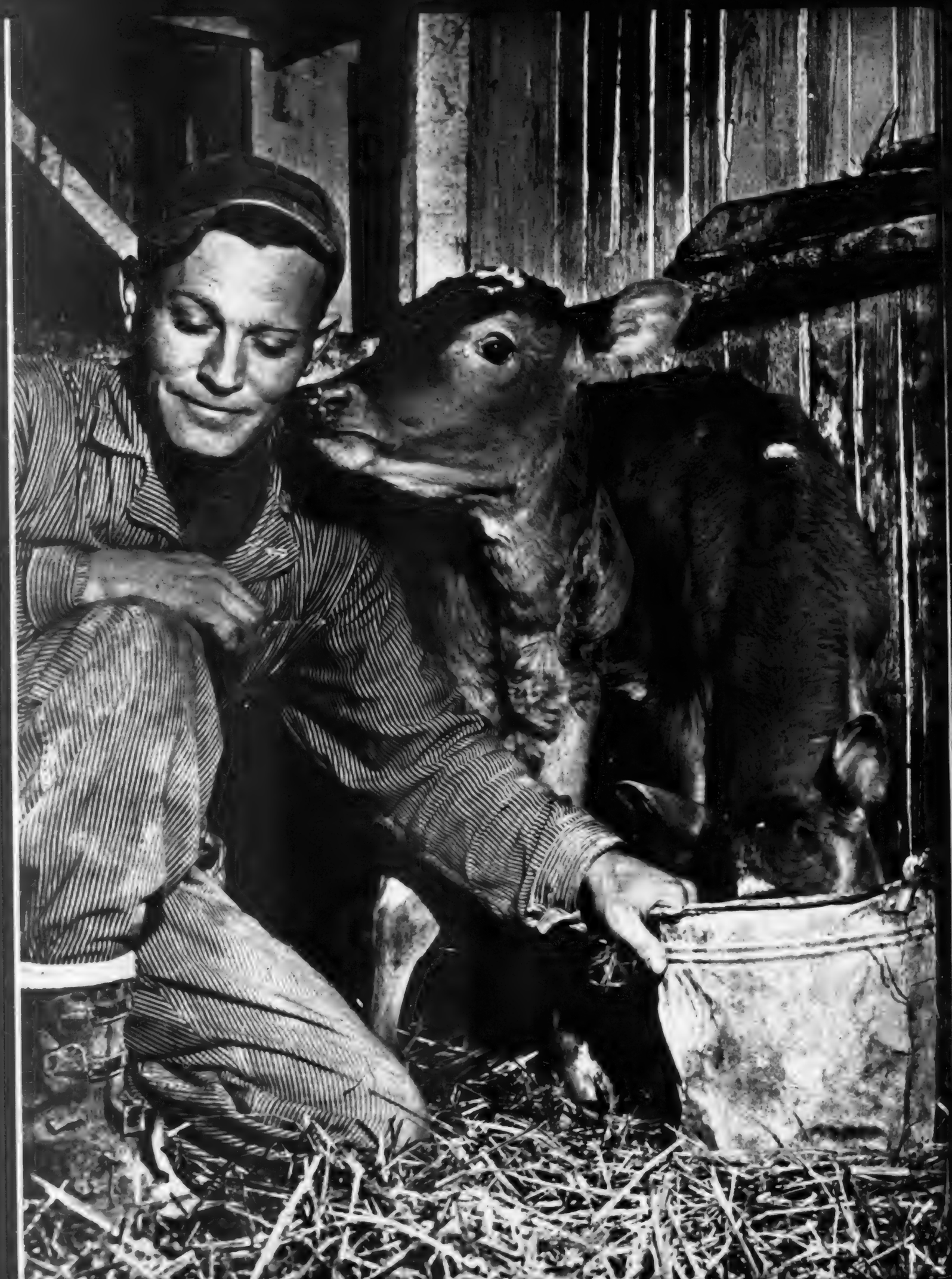
(Continued on page 106)



DOCKAGE IS SCREENED OUT by using two sieves, one with large holes that holds back the coarse material, and one with fine holes that retains the grain and lets the fine particles through to a pan below. Licensed inspectors and large elevators use a machine to separate dockage. Dockage is figured in percentages of the total weight and plays a part in determining the grade given to the wheat. Careless threshing is responsible for most dockage.



A FARMER LIKES TO SEE the scales and the Bureau of Standards certificate of accuracy. After dumping, the empty truck will be weighed and the load figured.



Can farmers afford to feed high priced milk to calves? New methods in calf feeding enable them to put more milk in the can and less in the calf.

How To Feed Dairy Calves

BY GEORGE LAYCOCK

MAN is a parasite on the cow. Ever since he learned that milk is a good food for humans as well as calves he has been searching for new ways to take more from the cow and give less to the calf. We feed milk to calves, but if the price of milk is high we are likely to skimp them. Then we look around for other methods of feeding to cut down the calves' milk consumption and leave more for the market.

In the search we have developed various milk substitutes and feeding programs that enable us to start young calves on grain or skim-milk and send the milk off to market where we can trade it for cash.

With the exception of one or two ideas, which we will come back to in a moment, nothing really new has developed in calf feeding for the past 25 years. Our method of feeding a new calf will depend on what use is to be made of the calf, whether it is to become part of the producing herd, or go off to market for veal.

The best way for a dairy farmer to get replacements for his herd is to raise them himself. Buying them is expensive, but even more important, he is seldom sure of what he is buying especially if he buys grade calves. If he raises his own calves he can select the best heifer calves his cows drop and have a pretty good idea of how they'll produce because he knows their background. To maintain a herd of ten cows he must raise three or four calves a year. The average productive life of a cow is four years which means that 25 per cent of the herd must be replaced each year. The calves he selects for herd replacements need a good start in life if they are to become producers that will earn their keep at the milking machine.

Good calf care starts long before the calf is born. Every calf inherits from its parents a potential adult size. A calf that is strong and vigorous at birth stands a better chance of developing into a good producer than it would if born weak and listless. The pregnant cow should get a diet complete in vitamins, minerals, and protein, so she is in good flesh at calving time. She should have all the good quality hay or pasture she needs plus twice daily feedings of 12 to 16 per cent protein supplement. If she is fed a good legume hay and silage the protein supplement need contain only 12 per cent protein. If she gets low quality roughage she should get no less than a 16 per cent supplement to help her keep up production while she is pregnant.

A calf will eat about 1,700 pounds of milk during its first four months if left with the cow. Many dairymen, by supplementing other feeds and weaning the calf at six weeks of age, bring this figure down to 350 pounds and still produce good dairy animals.

The First Drink

A calf should get its first drink of milk within an hour after it is born. If it is backward about locating the source of supply, or is too weak to stand up to the table, it can be held up and introduced to its mother's udder. The sooner it gets on the outside of a good meal the sooner it will begin to take an interest in life.

There was a time when dairymen threw away the colostrum that nature intended for the new-born calf. We have long since learned, however, that nature had a good idea in the first place, and now we make a point of seeing that the new-born calf gets a good share of the colostrum during the first three days of its life. If the mother has more than her calf needs it should be fed to other young calves and not wasted. Colostrum, which is the cow's first milk after calving, may supply 50 times as much vitamin A and carotene as regular milk. It is slightly laxative and helps build up the calf's resistance to disease. Colostrum milk is especially important to the calf because calves are born deficient in vitamin A.

The length of time a calf is allowed to remain with its mother varies from a couple of hours to six weeks or longer depending on the farmer's own ideas on the subject and the ideas that his state experiment station sends out. The majority of dairymen take the calf away from the cow from two to four days after it is born. Extension dairymen at Vermont say, "Not longer than 48 hours." In Illinois the move is recommended for the second or third day. Dairy specialists at the University of Maine say, "The end of the first day following birth." A good average time for the calf to stay with its mother is three days. At the end of that time the calf has had time to consume most of the colostrum and should be off to a good start.

The calf should continue to get milk until it is two months old. Dairy experts at the University of Minnesota say, "Seldom, if ever, should calves be weaned from milk before they are two months old and preferably not before they are three and a half to four months old." Dairymen, however, have an eye on the price of milk and usually take the calf off milk by the end of its second month. Many wean them at six weeks of age, and under ideal conditions will raise good heifers and bulls.

Bill Helton, who milks a herd of 25 purebred Guernseys on a 600 acre farm near Brookville, Indiana, says, "We take the calves off the cows at three weeks of age. For the next three weeks we feed them a half gallon of milk twice a day and gradually break 'em in on calf starter and

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BILL HELTON took these purebred Guernsey calves off the cows at three weeks of age. He fed them mother's milk for another three weeks while breaking them in gradually on calf starter and hay. Most dairymen would say he left the calves on the cow too long.

NEW-BORN CALVES that are too weak to nurse from the cow can get their first drink of warm milk from a bottle. After a feeding or two they should nurse normally.

AFTER CALVES are two weeks old they should get all the hay they will eat. Green, leafy legumes, cut young and sun cured, are best. Too much alfalfa can cause scours.

hay. At six weeks we have them completely off milk."

When a calf is taken from a cow it has to learn to drink from a bucket. The time tested method of teaching a calf this method of eating is to hold a bucket of warm milk under its nose and put two fingers in its mouth until it learns that it can get it faster without the finger. Nipple buckets with their artificial rubber teats are rapidly replacing the older method. Nipple buckets have the advantage of making it impossible for the calf to gulp its feed. They are also labor savers, since they can be filled with the proper amount of milk, and hung at udder level so the calf can feed while the farmer goes about his chores. The bucket should be removed when the calf has finished eating.

For the first month of its life the calf's primary food will be milk. Its digestive system is not ready at this tender age to digest fiberous feeds. It can start eating small amounts of hay and grain at two weeks of age, but it will be several weeks before these feeds will become major parts of the calf diet.

Milk should be fed at 95 to 100 degrees F. which is about the temperature at which it is taken from the cow. A thermometer is a handy tool at calf feeding time and its use will be rewarded by helping to keep the calf from going off feed.

In calf feeding, sanitation is next to Godliness. The milk and buckets from which it is fed should be clean enough for a person to drink from.

Over-feeding young calves can throw them off feed and give them a set-back. The milk should be weighed, and one pound fed for every ten pounds of live weight for the calf, so that a 90-pound calf would get nine pounds of milk a day. During the first week this should be divided into three feedings each day, and fed three pounds per feeding. As the calf gets older it can be fed twice a day. If there are no scales available for weighing the calf a good rule of thumb for feeding during the first week is: five pounds per day for Jersey calves, six for Guernsey, seven for Ayrshire, eight for Holstein, and nine for Brown Swiss. A quart of milk weighs two and one-tenth pounds. These amounts should be increased a pound per week.

Calves raised on a nurse cow are often allowed to run with the cow. The calf's feed, however, can be better regulated if it is kept penned, and turned in with the cow two or three times daily until two months old, then once a day until weaned. A nurse cow can feed from one to four calves depending on her production.

One method of cutting down the cost of raising calves is to replace the whole milk with skim-milk at three to four weeks of age. By that time the calf should be getting about one-half of its energy producing foods from hay and grain. The change from whole to skim-milk should

SOME FARMERS keep the calf with the cow three hours; some three months. Three days is average, depending on the price of milk and the use to be made of the calf.

be made gradually, since the skim-milk contains only about one-half the calories that whole milk contains, and a sudden change can upset a calf's digestion and cause scours.

Skim-milk, fresh from the separator, is best for calf feeding. If skim-milk is available and is cheap enough it can be fed until the calf is six months old. Skim-milk from creameries should not be fed to calves unless it has been pasteurized. Unpasteurized milk may carry Bang's or TB and if fed to heifer calves they may turn out to be reactors at their first freshening. After drinking, calves should be tied to keep them from sucking each other.

Hay for calves should be good quality legume, preferably red clover or alfalfa. The calf, in addition to milk and supplement, should get all the hay it will eat from the time it is two weeks old on.

A calf supplement mixture, which is first fed when the calf is two weeks old, can be either purchased already prepared or mixed at home. Commercial calf feeds come in either pellet or meal form. To get the calf started on grain feed, rub a little feed on its nose. Each day throw a handful of the mixture in a box in the stall. It won't be long until the calf is waiting for the supplement at feeding time. At two months of age it will eat one and a half to two pounds a day; when it is three months old it will eat three to four pounds of grain, and when four months old will eat up to four pounds. During the first six months of its life a Jersey calf needs about 400 pounds of meal and a Holstein 500 pounds.

The farmer who would rather mix his own calf starting ration to feed with hay and milk can use the following guide, suggested by the dairy husbandry men at Purdue.

	Pounds
Ground yellow corn	30
Crushed or rolled oats	30
Wheat bran	12
Linseed oil meal	15
Dried skim-milk	10
Steamed bone meal	1
Finely ground limestone	1
Cod liver oil	¾
Irradiated yeast	¼

Calves can, at four months of age, be switched to a grain mixture composed of 25 per cent each of yellow corn, rolled oats, bran, and linseed meal. Until the calf is six months old it should get up to four pounds of this mixture daily, depending on what it will clean up.

Young calves don't come equipped to handle green pasture grasses. Their rumen is undeveloped and eating grass can cause

(Continued on page 137)

Our great-grandfathers made cider and apple butter from Stark apples. Today Stark Brothers Nurseries & Orchards Company is the biggest name in fruit trees. Eight Stark men run the million dollar corporation on the bluffs of the Mississippi.

THE STARKS

BY JOSEPH H. FLORY

ON THE wall over the fireplace in the offices of the Stark Brothers Nurseries & Orchards Company in Louisiana, Missouri, hangs the portrait of a stern man who appears to have just taken a bite of a very green persimmon. The portrait is an oil painting copied from a daguerreotype, made sometime before the Civil War, of Judge James Stark—the founder of Stark Brothers Nurseries & Orchards Co. —the largest and oldest fruit tree growers and sellers in America.

Judge Stark came out from Kentucky in 1816 and picked the spot for his homestead on the sheltered side of the high bluff rising from the west bank of the Mississippi. He liked it there because it looked to him like a good place for an orchard and it gave him a good view of the surrounding country. His dour outlook on life may have come from his Scotch ancestors, but present-day Starks believe it developed on the long walk out from Kentucky. He reared 17 children, and fetching up this brood in Indian country would have tightened the disposition of the most confirmed optimist.

No less important than the safety of his family to Judge Stark was the contents of his saddle bags, a bunch of apple scions from his father's orchard in Kentucky. Judge Stark was to the near West what Johnny Appleseed was to the Ohio Valley. At first he gave his trees to the settlers, but being practical and Scotch, he began to charge a few coppers when the homesteaders and their demands increased. In those days the planting of an orchard was second only in importance to building a shelter. Stark trees spread their branches over the Midwest and into the Missouri and Mississippi Valleys. The name became a household word. The trees that Judge Stark sold filled the barrels in the cellars of our great-grandfathers, became gnarled and old, died and were replaced by other Stark trees from a later generation.

The Stark tree business coasted down the century to the Civil War under the thrifty eye of the Judge and his son. The head of the house in war time was William Stark, one of the Judge's 17 children and the only one to remain in the business. William took the family and the business

safely through the panic of 1873 but the effort was too much for him and he died soon after. Three of his five children were boys—Edgar, Clarence and William P. It has been a family affair since 1816 with practically all of the stock in the hands of the Stark family, which has continued to run the business through five generations. They incorporated the business in 1889 for $50,000.00. In the spring of 1896, the Nursery was re-organized, modernized and re-incorporated for $300,000.00. Eugene Stark, the son of Thornton Stark, one of the original 17 children, was urged to join as a stockholder and officer of the company. He became secretary and was placed in charge of the sales department and office management, which position he held until the time of his death. In 1902, the capitalization was increased to $1,000,000.

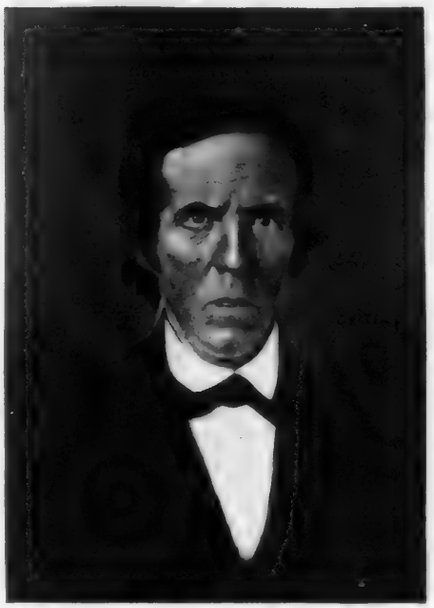
Born to the Business

The business today is in the hands of eight Stark men. They are a healthy good-natured lot, all of whom have grown up in the business and do their separate jobs with no more than average friction. If there has been family feuding or major differences of opinion, the outside world knows nothing about them.

Each member of the family is responsible for a department, and reports to the Board of Directors each Tuesday morning when the business as a whole is given a good going over and major decisions are made for future operations.

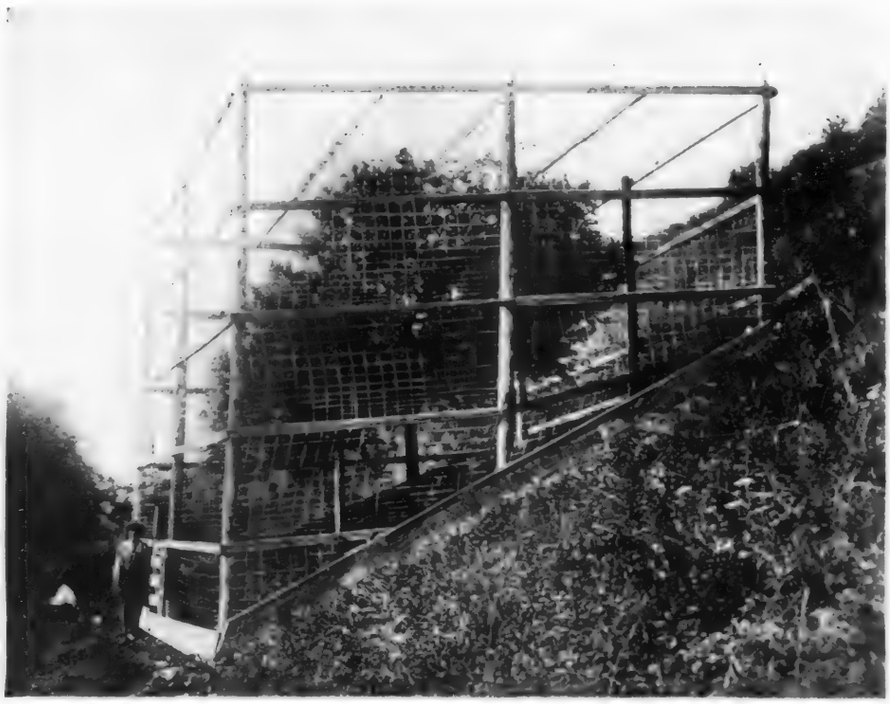
The head men of the Stark clan are Clay, the president, and Lloyd, chairman of the Board. Clay assumed the presidency upon the death of his father Edgar, who held the position from 1911 to 1935. Lloyd took over the Board chairmanship upon the completion of his term of boss-busting Governor of Missouri in 1941. Paul Sr., brother of Lloyd, and second son of Clarence, is vice-president. Edwin and Lawrence, sons of Eugene Stark are vice-president and secretary-treasurer, in that order. John Stark Logan, grandson of Edgar and nephew of Clay, is assistant secretary-treasurer; John, son of Lloyd, is assistant secretary. Paul Jr. is assistant treasurer.

In actual operation of the company,



JUDGE JAMES STARK carried apple scions in his saddle bags when he went out to Missouri, reared 17 children in Indian country, and founded the Stark dynasty.

THE MANAGEMENT OF THE Stark enterprise passes only to the male line. Eight men, seven Starks and the son of a distaff heir, run the business today. They are, left to right: John Stark Logan, Edwin J. Stark, Lloyd C. Stark, Clay H. Stark, Paul Stark, Sr., John W. Stark, Lawrence E. Stark, and seated, Paul Stark, Jr.



THE ORIGINAL YELLOW DELICIOUS TREE, a sport found growing on a West Virginia hillside. Owner A. H. Mullins, standing beside the gate, was paid $5,000 for the tree.

PARENT TREES are stripped of scions each spring. The scions are grafted to roots grown on the West Coast. A scion tree outlives its usefulness in a few years.

Clay handles finances and general administration. Lloyd is in charge of sales and advertising and Paul directs research and promotion. Lawrence runs the office and is director of the budget. He is assisted by John Stark Logan. Edwin is responsible for the propagation and shipping, including the supervision of all branch plants. He is assisted by Paul Jr., who also heads up horticultural research. John does the color photography on fruits, shrubs and roses and helps in advertising and publicity.

Coming on in the sixth generation is Lloyd III, who is at Cornell University being groomed for the business. Paul III, born early in 1949, also sixth generation, received his first indoctrination last spring when his bassinette was hung from the limb of an apple tree in the back yard of his home. John Stark Logan has contributed his part to the sixth generation in the form of 9-months-old Clay Stark Logan. The Starks, old and young, have ruddy cheeks, suspiciously like the blush on a half-ripe Starking Delicious Apple.

All but Lloyd have been in the business since graduation from college. He received an appointment to Annapolis and had just received his first promotion when his father died and he came back to take over duties with the company. Blood was thicker than salt water and so apparently was apple juice. When World War I came along he went into the army and served as a Major. Etchings of ships hanging on the wall of his office contrast sharply with four-color portraits of apples. He broke away again temporarily to make a successful bid for the governorship of Missouri and served from 1936 to 1940. He then took a try at the U. S. Senate, running on a reform ticket. Pendergast saw that the ticket was split three ways and a former Independence haberdasher by the name of Harry Truman beat him out by a close margin. When Lloyd was at Annapolis he was known as "Molly." It was his great - great - great - grandfather, General John Stark of Washington's army, who uttered those famous words known to every schoolboy, "Tonight the American flag floats from yonder hill or Molly Stark sleeps a widow."

Lean Years and Fat Years

The administration offices of the Stark Company look like an over-grown mansion of a rich farmer. This was intent and not a make-shift. "Uncle Edgar built that house," Paul Jr. says, "because he had been through a couple of terrific depressions and he wanted an office that could be converted into a home and sold if the Starks ever went under." This dread of a depression is no mere fancy of Edgar's. The company has run the gamut of depressions since 1816 and only by the merest chance weathered the big one in 1893. During the business low employees and family friends kept the company out of the bankrupt courts. Ed Harpole, a superintendent who was to spend 52 years

with the company, went to the brothers in that dark hour and tossed a bundle of greenbacks on the table. "I hear you need money," he said. "Here's $2,000.00, all I have, but you're welcome to it." Fielding Estes, close friend of the elder William Stark, sent for Edgar, then head of the business. He dropped $10,000.00 in gold in Edgar's lap. "Your father and mother were my dear friends," he said. "Pay me back when you can."

Laborers and foremen on the Stark farm accepted scrip for pay; and Lloyd Stark and his brothers, then small boys, wore patched pants Sundays and week days. The company survived.

In the company at the turn of the century was a Stark of rare talents. Clarence Stark had advanced ideas on promotion and the opening of the World's Fair at St. Louis in 1904, almost in the Stark's back yard, gave full scope to his ideas. He designed an elegant catalog, printed in four colors, and distributed 100,000 of these at the Fair. An avalanche of business came pouring into the Louisiana office and the firm became one of the six biggest advertisers in the country.

The Starks will tell you that for generations the Bible, the Old Farmers Almanac and a Stark catalog were the only pieces of permanent literature found in many farm homes. The first catalog in color was brought out in 1898. The prices quoted in this deluxe catalog are amazing today.

The early catalogs were homely, chatty and comfortable. Filled with testimonial letters and personal experiences of buyers of Stark trees, they made good winter evening reading.

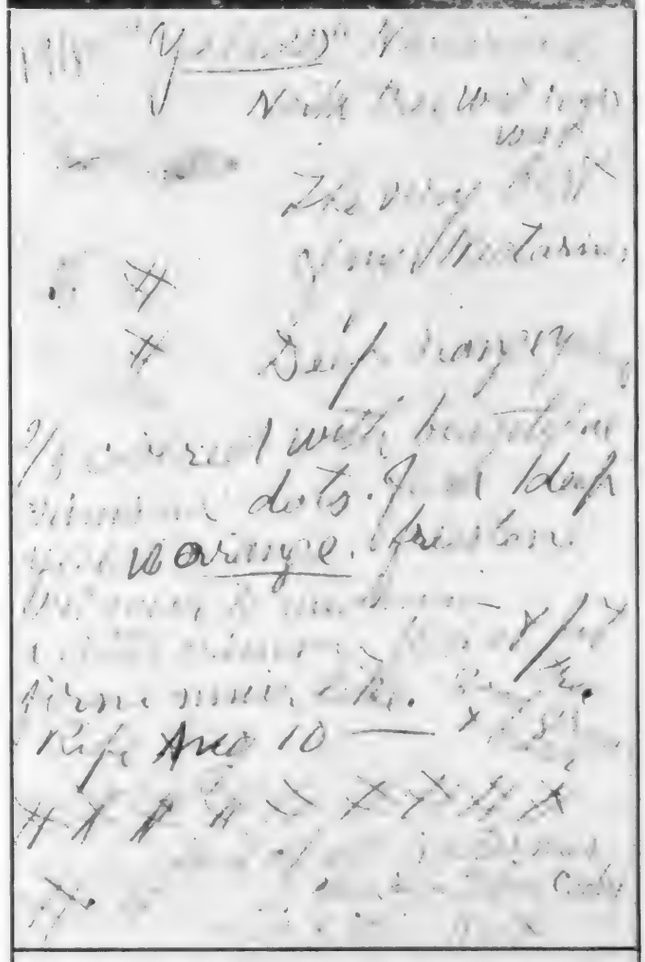
Occasional bits of morality lent plausibility to the flamboyant pictures and claims made for Stark trees. The 1898 catalog was illustrated by actual photographs, "pictures true to Nature because made by Nature's Sun himself." The preface made the point that, "Life is real, life is earnest, and one of the most earnest things in life is getting on in business." In the same paragraph is a back-handed slap at competition. "One ugly, little fact, as Huxley says, will destroy the most beautiful theory ever constructed . . . Some writers seem to teach that each variety they catalog is 'one of the best.' We have not found it so."

Care was taken not to over-sell a variety. Sometimes the description was frank to the point of bluntness, as for a new apple tree, the Springdale. This apple is recommended with a great deal of restraint: "Large, coarse-grained, mild, good—but lacks color and is a poor keeper."

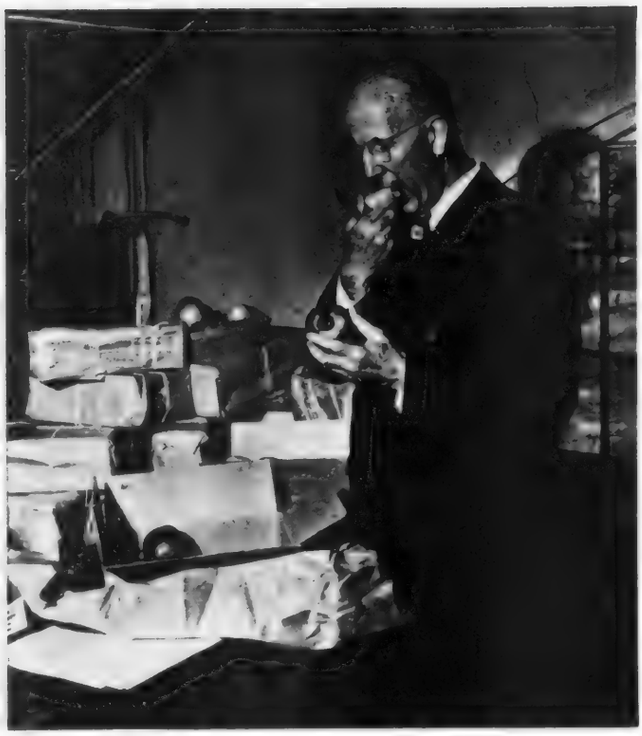
The Burbank Legacy

Modern advertising methods and the possession of outstanding apple varieties were sending the Stark business into the upper brackets when a third factor came along to boost their stock still higher. This was a business arrangement with Luther Burbank, the "Plant Wizard." The Starks made him an offer of several thousand dollars for three varieties of fruit which they liked. They urged him to devote all of his time to the work he loved in breeding new varieties. This was one of the important factors in Mr. Burbank's decision to discontinue his time-consuming nursery operations and expand in the field of plant invention and improvement. Upon his death his entire stock of new plants and experiments were turned over to the Starks who are continuing with the work in their experimental orchards at Sebastopol, California; Louisiana, Missouri; and Atlas, Illinois. They now pay the Burbank heirs a royalty on everything they sell from this gold mine of fine fruit varieties. One of the Starks' best peaches is a fuzzless variety developed by Burbank.

If Clarence Stark's genius in advertising and the access of Luther Burbank's treasury of new varieties were steps upward, the chance discovery of the Delicious apple made the name a national by-word for fine fruit. The discovery of the Delicious was a by-product of Clarence Stark's advertising. He came up with the idea of an apple show. The show was held at Louisiana, Missouri, in 1892, and Professor Van Deman, U. S. Pomologist, was brought from Washington as the judge. The first prize went to a plate of strikingly red apples which were the most novel in both appearance and taste that the brothers or the judge had ever encountered. The owner was not present, but that was not what worried the brothers. A frantic search failed to reveal his name or address. The entry card had been lost. Although the



The horticultural legacy of Luther Burbank, which passed to the Starks at his death in 1926, included more than 28,000 varieties. These included exciting new varieties of fruits and flowers which the great experimenter had developed and never marketed, 120 plums, 18 peaches, 28 apples, 500 hybrid roses, 30 cherries, 34 pears, 52 gladiolas and many others. At one time his records show that he had over 800,000 separate fruit experiments under way at his Goldridge Farm, near Santa Rosa, Calif. Burbank found it difficult to introduce a new variety of fruit; he sold only seeds and bulbs to finance his large and expensive experimental farm. He estimated that he spent $25,000 a year for 35 years and each completed experiment represented an outlay of $500 to $5,000. Above are his final notes on his famous "fuzzless peach," the Flaming Gold Nectarine.



PAUL STARK, SR., hopefully samples the contents of a "surprise package."

A GOOD MAN with a boy helper can make three thousand root grafts a day.

A PLANE is used to dust trees in the constant battle against insect pests.

show was a success, the Starks were bitterly disappointed, for they felt that something of genuine importance had been within their grasp and had slipped away. The only thing they could do was to wait until the next year and put on another show with the hope of attracting the unknown exhibitor. Luck was with them. The next year there were not only five apples, but a barrel of them, and this time they did not lose the entry card. It bore the name of Jesse Hiatt, a Quaker farmer who had an orchard near Peru, Iowa. They hastened to buy all rights to the tree and in their catalog of 1894-95 they first listed the Stark Delicious apple trees.

The Precocious Hybrid

The Stark Delicious apple originated as a chance seedling. Jesse Hiatt found the sapling growing in his orchard near a Belleflower tree. He chopped it down, but it grew up again and he permitted it to bear a crop. Orchardists were slow to take up the Delicious. There are styles in apples as well as in women's hats and the five bumps on the end of the Stark Delicious was something new to apple men. The Starks pushed it, enclosing a free Stark Delicious tree with orders for other apple trees. When the apple boom in the Northwest got well under way it became the favorite of the orchardists in Washington, Oregon and Idaho. It is now grown all over the world.

The original old Delicious tree, torn and disfigured by a half century of winter winds, is still standing in Jesse Hiatt's orchard. It is surrounded by a burglar-proof cage and if the Starks had their way it would have been canonized long ago. In 1940 a blizzard swept across Iowa, killing almost all of the fruit trees in the western part of the state. Among them was the old Delicious tree. The news spread. The Starks went into mourning and newspaper writers and radio commentators wrote tearful obituaries. Fulton Lewis, Jr. devoted his entire radio time one night to a farewell eulogy. But, like Tom Sawyer and Huck Finn, who came back to witness their own funeral, the 67-year-old tree shook its head, got up from the floor and put out a new sprout. It is now growing vigorously and a horticulturist has been retained to care for it and guard the shrine.

The Starks employ plant scientists and do some work in cross pollination and plant breeding, but the fortunate chance discovery of the Delicious has led the Starks to believe that every back yard and orchard in the country is a potential birthplace for valuable new varieties. The stablemate of the Delicious was also a chance discovery, and quite as amazing.

In the spring of 1914 Lloyd and Paul Stark opened a box of apples which had just come in by express. The box held a few yellow apples, but there was nothing about them to excite the two men. Lloyd mechanically wiped one of them and took a bite. He knew at once he had bitten into an entirely new and different apple. "That's a new apple!" he said. "I would say it's Grimes Golden, but this is April and Grimes should have been gone for several months." It closely resembled Grimes Golden, but had an entirely different flavor and the conic shape of the Delicious. The box had come from Odessa, an obscure Post Office in West Virginia. It was a long shot, but the Starks had always felt that if a really good yellow apple came along the public would accept it.

Paul decided to make the long trip to West Virginia. By narrow gauge railroad, horse and buggy and the final few miles on mule-back, he arrived at the hillside farm in the West Virginia mountains. No one was at home, so while waiting he decided to have a look at the unpretentious seedling orchard back of the house. "I didn't see anything there," he says, "and was about ready to give up when my eyes fell on a tree half way up the mountainside. Unlike all the other trees in the orchard, it had

(Continued on page 117)

THE KING of the nation's fruit bowl is the Starking Delicious, a deep red, early-coloring bud sport. It won the Wilder medal, the Academy Award of the horticultural world. Sharp-eyed fruit growers will note the picture is up-ended to show the full branch. The right hand side is the bottom.

The Perkins Reunion

Cousin Molly (she's the one helping herself from a bowl of string beans) usually starts off the family reunion and picnic by calling Grandma Perkins and asking, "Isn't it about time we set the date?" Grandma knows when it's going to rain and when it isn't. When the new moon comes in wet, she counts off 60 days, and then there's always a spell of pretty weather. Grandma set the date this year for October 8th. The Perkins always go to Peach Grove, near Marion City. The society editor of the Marion Sentinel, wise in the ways of county circulation, wrote:

> The Perkins are having their annual family reunion and picnic at Peach Grove next week, on the 8th, and Mrs. Emily Perkins has been calling the family. Everybody will meet at the Grove at about ten in the morning. Mr. and Mrs. Clarence Lawson, who have a new Dodge truck, will pick up the Perkins on the Losantaville Creek, and the Evans on the Lebanon Road. It's a basket picnic again this year, the 18th one in Peach Grove for the Perkins family. Everybody expects to be there, except Li Perkins, who re-enlisted in the Navy last month. Mr. and Mrs. John Perkins (she was Mary Lawler from Lebanon, and they were married there six weeks ago) will be the youngest couple. Mrs. Molly Perkins, who is in charge of the food arrangements, says she expects about 40 of the family to be present.

For the past two weeks, the women folk had been planning the dinner. Everyone had a job. The day before was spent frying chickens, baking cakes and pies, putting up potato salad and pots of baked beans.

On the morning of the picnic the chores

were done earlier, and along about ten most of the Perkins family were visiting with each other at Peach Grove. The men set up a long table on saw bucks, tidy up the picnic stove for the hot coffee, and drive some pegs for the horseshoe games.

The men sat around for a while, chewing on stems of blue grass, and talking about the crops. It had been a wet spring, the wettest anyone remembered. But the frost held off, and it looked like 100-day corn would do as good as it had done three years ago, when it made 60 bushels. The oats were lodging from the wet. Some of the Perkins were worrying about running out of feed.

Uncle Amos, who was once county horseshoe champ, picked up a set of shoes, banged them together, and announced that he was still "the best danged horseshoe pitcher in Marion County". Several games got under way, the kids wandered off down the creek to fish and wade, and the women began to set the long table. They were proud of the things they fixed but were careful to say they weren't. "Just threw it together every which way. I don't even remember whether I ground any mustard seed in it." This from Aunt Emmy, whose tangy potato salad had been a county fair winner for so many years that folks didn't feel like competing against her any more.

By the time dinner was spread the kids, catching whiffs of the good things to eat, stopped their play and drifted back to the table, getting under their mothers' feet. Finally Aunt Molly called out, "It's ready," and everyone made a rush for the table and found seats on the benches. Grace was said and the Perkins family fell to. Talk gave way to eating.

After dinner everybody felt sluggish, and talk was slow. Some of the men went to sleep under the trees, babies dozed on their mothers' laps, and young Amos Perkins discovered that a distant cousin had grown up to be a very pretty girl since last year's reunion.

The first sign that the day was ending came from one of the women who sensed that chore time was near. They began to pack the left-overs into baskets, and the city relatives said goodbye and drove away.

As the crowd thinned, a blue jay which had been waiting till young Bobbie Perkins had put his sling shot back in his pocket and climbed into the family car, flew low over a table and scooped up a big crumb. Others followed, converging on the extra big pile of cake crumbs on the bench where little Maybelle had been sitting.

One by one the cars and the trucks disappeared over the sharp grade out of the grove and fanned out to the farms and villages of the county. Everybody had promised everybody else to visit during the year, but the Perkins family would see very little of each other until Aunt Molly started calling them again for the annual reunion, come next October.

MEN ARE ALWAYS SHOWING OFF. One of the country Perkins fails to impress a city cousin. Picnics are really for kids—cake, fried chicken, new playmates, and the old folks do all the work.

FROM A BUSHEL of corn, or its equivalent in other grains, plus malting barley and yeast, nine pounds of Light Grains and nine pounds of Solubles are obtained. Either may be mixed in feed individually or combined to form 18 pounds of Dark Grains.

DISTILLERS FEEDS

The distillers return one-third of the grain they use in making spirits to the farm for stock feed. Distillers Dried Grains and Solubles supply a 20 to 26 per cent protein supplement for formulas.

LONG before Moses led the children of Israel out of the wilderness, the Chinese were feeding the by-products of their home stills to their animals and eating a little of it themselves when times were hard.

The distilling of grains, originally a farm enterprise, is almost as old as farming itself; and from the earliest times farm stock has been fed the residue of stills.

Here, in America, we were not so thrifty. Some wet stillage has been fed, in localities near distilleries, since the turn of the century, but with traditional American wastefulness we have dumped the bulk of the by-products of our distilleries into streams or hauled them out on fields to decompose in the sun. The advent of the technical expert into the distilling industry plus the pinched economy brought on by two wars have prodded the distillers into a more economical turn in their business methods: within the last few years the by-products of the distilleries have been enjoying a new role as a major source of animal feed.

During World War II, with grain in short supply all over the world, public sentiment ran heavily against the allocation of grains to distillers to produce beverage spirits, although the distillers worked in three shifts the year around to produce industrial alcohol for rubber and other war materials. The grain shortage was coupled with an acute shortage of protein for stock feeds. To help meet this twin emergency, the distillers launched a program of experiment in the use of their by-products as stock feed. Methods of drying the stillage were developed and the industry joined hands in efforts to market a uniform product. Agricultural schools and the distillers themselves took the dried grains and solubles direct to the feedlots for tests.

Some people believe that no good can come from alcohol and to all distillery products they attach the odium of the old-time liquor traffic. The distillers set out to overcome this prejudice. The production of alcohol, they said, for beverage or for industry, does not necessarily take scarce feeds out of the bellies of farm animals. Only .76 per cent of the nation's grain goes into the production of beverage alcohol, and the distillers turn back one-third of this small percentage to the farmers in a form which has approximately as much feed value as the original grain.

The distillers can actually take a bushel of corn, extract its starch for alcohol and return the residue in a concentrated form as a stock feed with practically no loss in nutritional value even though the energy value of the starch is lost. One-third by weight of the original grain becomes available for feeding purposes and as a supplement, with ingredients supplied by the yeast, its value closely approaches that of the original bushel of corn.

What Manner Of Stuff?

Persons outside the distilling and feed industries often ask, "What are distillers feeds?" A simple answer is that they are a combination of the original grain and added malting and yeast products left over in the processing of grain by a distillery. Only the starch in a grain is removed in making alcohol. The proteins, fats, minerals and vitamins are residue in concentrated form. These are further enriched by the yeast which performs a vital function in the fermentation by which the alcohol is produced.

After the mixture, commonly known as mash, has fermented and the alcohol distilled off, what remains is called *thick stillage*, which is about the consistency of gruel. From this is processed the distillers feeds. The thick stillage is run over screens which strain out the liquid, leaving the solid matter. This solid matter is dried and is known as distillers *light dried grains*. The liquid which passes through the screens is evaporated to a golden brown syrup, subsequently dried and is known as distillers *dried solubles*. When the syrup is mixed with the light grains a third type of feed is produced. This is called distillers *dark grains*. The three products have slightly different uses and are mixed with feeds in different ratios. Near some distilleries which do not have complete recovery facilities, the wet stillage is fed direct to stock.

The dried grains, from the original combinations of corn, milo, rye and barley malt, are similar in color and texture to some of the familiar breakfast cereals on the market—about what you would expect from ground grain soaked in water and dried. The solubles are finer in texture, a flaky meal, light brown to dark brown in color. The dark grains, a mixture of the dried grains and the solubles, are dark brown in color and in-between in texture. All three have a slight odor of toast. In a pinch any of them could be used as a human food, although the slightly sour taste, due to the lactic acid, might be objectionable, especially in the solubles. If dressed up a little they make a tasty human food in the form of crackers, cereal supplements, and soups. There is no alcohol in distillers feeds and farmers need not fear that the hired man or the pigs will go on a binge as they sometimes do when the juice of the silo is working.

The Chinese, Canadians and Europeans found from experience that animals thrive on distillery by-products, and by trial and error they arrived at fairly sound feeding formulas. It was left to Americans, with our insatiable curiosity, to find out why these results were produced. All forms of grains and solubles have been analyzed in the laboratory and fed to stock in the feedlots; we know almost all the feeding values. We know the protein, fat and mineral content and are daily discovering more about the vitamins, amino acids, and unknown growth factors. A large number of tests have been made to determine the best combinations of forage, grain and supplement and how distillers products compare with the old standbys such as linseed oil meal, soybean meal, fish meal, meat scraps, and other sources of proteins. The bulk of this knowledge has been acquired only since 1939, and therefore there are still some unknown factors in the performance of distillery stock feeds. Farmers who use them say that they not only produce the known results which their analysis would foretell, but that they impart to an animal a tone or mellowness the source of which has not yet been explained. This

GRAND CHAMP of the 1948 Bourbon Beef Show, a steer grown and finished on distillers feeds. Owned by J. D. Gay, Pine Grove, Ky. Dave Morgerson, Gay's herdsman, is showing the steer. The Blue Ribbon brought with iit a $1,000 prize.

THE SCREENED-OFF SOLUBLES are run between a series of hot rollers and come out a brittle sheet which is ground, bagged and is then ready to mix as feed.

GRAIN USED FOR SPIRITS is top quality. It is carefully tested, weighed, and combined in exact amounts for the mash bill. Quality ingredients make a quality feed.

comes out in the better health of the animal, higher conception rate, and a tendency to put on weight at a faster rate, and higher production in dairy cattle.

Since 1939 the commercial feed mixers have been using more and more distillers dried grains and solubles, and a great many commercial feeds today contain these products. They are the components of feeds for beef, dairy cattle, hogs, sheep, poultry, small animals, and fish.

Feed makers say they like the versatility of distillers grains. They can be used as a supplement for feeds for all the stock on a farm, from dairy cows to poultry to dogs. Wm. A. Dustin of the C. & D. Feed Co., Rockport, Ill., says, "We regularly include five per cent of distillers dried corn solubles in all our feeds for both animals and poultry. Compared to ingredients of similar costs they are high in B complex vitamins. Experiments by Fairbanks and Krider at the University of Illinois indicate they have a place in swine rations as commonly prepared in the Midwest. Minor objections are that they are inclined to cake in storage and have not always been available when we want them."

The *grains* are favored for cattle and other ruminants, which have a vitamin factory within their own digestive system. The bulk and protein content of the grains and their palatability are especially what cattle like. Poultry and hogs, having less storage space, must have pre-formed vitamins and a supplement low in fiber. For this reason the *solubles* are best for chickens, hogs, calves, and small animals. Solubles are also coming into use as a food for fish in hatcheries and fish ponds.

If a farmer mixes his own feeds he can sometimes buy the distillers grains in pure form from his dealer, although most of the supply is used by feed manufacturers for formula feeds. If he buys custom mixed feeds he can specify that they include the grains or solubles. The supply is growing and most dealers and feed mixers can obtain reasonable amounts, although areas near the distilleries are more favored than others because of freight costs. In total amount used, distillers grains and solubles now rank fifth among supplements containing over 20 per cent protein.

What's In Them?

A grain mixture from which alcohol is made is called a "mash bill" by the distillers. A typical bill for bourbon whiskey is 60 per cent corn, 28 per cent rye, and 12 per cent barley malt. For the production of neutral spirits the mash bill is 90 per cent corn or milo and 10 per cent barley malt. Basing this on a 56 pound bushel the content is as follows: moisture 6.33 pounds, starch 33 pounds, protein 5.01 pounds, fat 2.07 pounds, fiber 1.8 pounds, ash .9 pounds, vitamins .027 pounds, and about 7 pounds of amino

A KENTUCKY CATTLE MAN feeds Distillers Dark Grains as part of a formula mix. Some feeders like to throw the Grains or Solubles over a hay ration. They increase palatability and assimilation of protein in the hay, and stimulate rumen bacteria.

acid mixtures and miscellaneous. To make mash, the grain is ground and water added; it is cooked and partly cooled; malt is then added; it is cooled further, yeast is added, and fermentation starts. When fermentation is completed and the alcohol distilled off, there remains 17.55 pounds of residue in a dried form. This is approximately 30 per cent of the original grain by weight. Starch has been eliminated with the exception of 1.05 pounds. There is a slight decrease in the protein which is now 4.97 pounds. The fat is decreased to 1.95 pounds. There is a substantial increase in the ash content, principally in calcium. Fiber remains the same and the vitamins are increased slightly. In addition, there are a number of protein acids and nutritional elements produced from the yeast. Fermentation, the extraction of the alcohol, and drying concentrates the nutrients in the dried product. For instance, the very important item of protein makes up 4.97 pounds of the 17.55 pounds of the residue, or between 20 and 30 per cent, depending on the mash bill. Compared to the traditional protein supplement sources such as soybean oil meal, linseed meal, cottonseed meal and others, distillers dried grains and solubles supply a higher percentage of digestible nutrients. Because the kind and quality of grains used by the distillers vary, the grains and solubles vary. The best analysis comes from mash bills in which high-protein corn is predominant.

Morrison, the standard for all evidence in feeding, gives the following rating of the leading protein supplements:

Product	*Per Cent Total Digestible Nutrients*
Distillers Corn Grains, Dried	85
Soybean Oil Meal, below 43 per cent protein	80.5
Soybean Oil Meal, solvent process	77.6
Corn Gluten Meal	81.8
Cottonseed Meal, 41 per cent protein	73.6
Brewers Grains	65.3
Linseed Meal, old process	78.2
Meat and Bone Meal	71.5
Fish Meal	67.6

Most of us know with reasonable accuracy the functions of the more familiar ingredients of a good stock feed. We are reasonably schooled in the value of proteins, fats and minerals. However, when the nutritionists start throwing vitamin and amino acid (the amino acids are the growth factors in proteins) talk at us we sometimes wish we had "stood in bed." The vitamins and the acids, we know, are just as important as the proteins, fats and minerals in animal nutrition, but we have the typical layman's feeling of frustration when the scientists parade jawbreakers such as pantothenic acid, riboflavin, niacin, and amounts measured in milligrams per pound. Distillers grains do contain, by laboratory test, all the important B vitamins. They contain a concentration of the valuable complex B vitamin and are heavy in choline, which stimulates the assimilation of phosphorus by cattle. In addition they are plentifully supplied with the important amino acids, 10 of which are essential to growth. We like to know the grains and solubles are rich in these contents but are happy to leave their scientific names to the scientists. The following table gives the composition of typical distillers feeds where high protein corn is the principal grain in the mash:

Components	*Light Grains*	*Solubles*	*Dark Grains*
Protein	21%	26%	23%
Fat	10%	5%	9%
Fiber	12%	3%	8%
Lactic Acid	.5%	9%	4%
Carbohydrates (N. F. E.)	40%	54%	45%
Minerals	4.5%	8%	6%
Vitamins	Good	Excellent	Very Good

Variables are moisture and fiber content. Protein may go as high as 30% in some Solubles.

Distillers Grains As Feed

There is a paradox in the production of distillers feeds that seems to blow sky high the validity of the old adage that you can't have your cake and eat it too. A farmer has 10 bushels of corn; he sells

STOCKMEN WHO MIX their own feeds find that Distillers Grains and Solubles replace any of the usual protein supplements except animal proteins where these are needed.

two bushels to a distiller, who makes alcohol from it and then returns the residue to the farmer. The farmer then adds this residue to his eight bushels of corn and finds that he has about the same nutritional feed value he had in the original 10 bushels of corn; his cattle will gain as much or more from the mixture as from the pure grain, because the distillers supplement not only has high nutritional values, but it stimulates digestive processes of the animal permitting more efficient utilization of grain and forage.

Another way to say this is that if grain is properly supplemented to make a balanced ration a farmer can feed less and get more. At the University of Kentucky's research farm, half a herd of steers was fed 1,000 bushels of corn without supplement. The other half was fed 800 bushels of corn plus distillers grains made from 200 bushels (66 pounds). The second group gained more than the first, and at less cost for feed.

Best As A Supplement

Distillers dried grains and solubles are not, in themselves, a complete feed, but give best results as a supplement, to grains and forage. They are also used as a source of protein, fats, minerals and vitamins in mixed feeds.

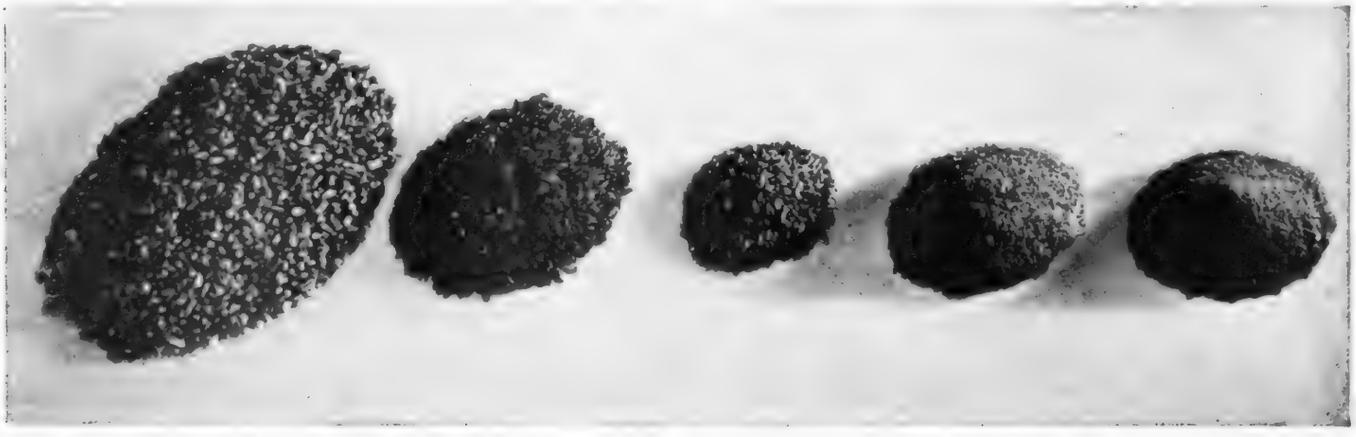
For a balanced ration, grains are too heavy in carbohydrates and too light in protein, minerals and vitamins. The best modern feeding practices recommend that a supplement be added to bring into balance the starches and proteins, and to add as needed the proper minerals, vitamins, and other growth and health components. For many years now this protein supplement has been added in the form of cottonseed meal, soybean meal, corn gluten meal and others. Distillers grains and solubles are now accepted as a member of the protein family.

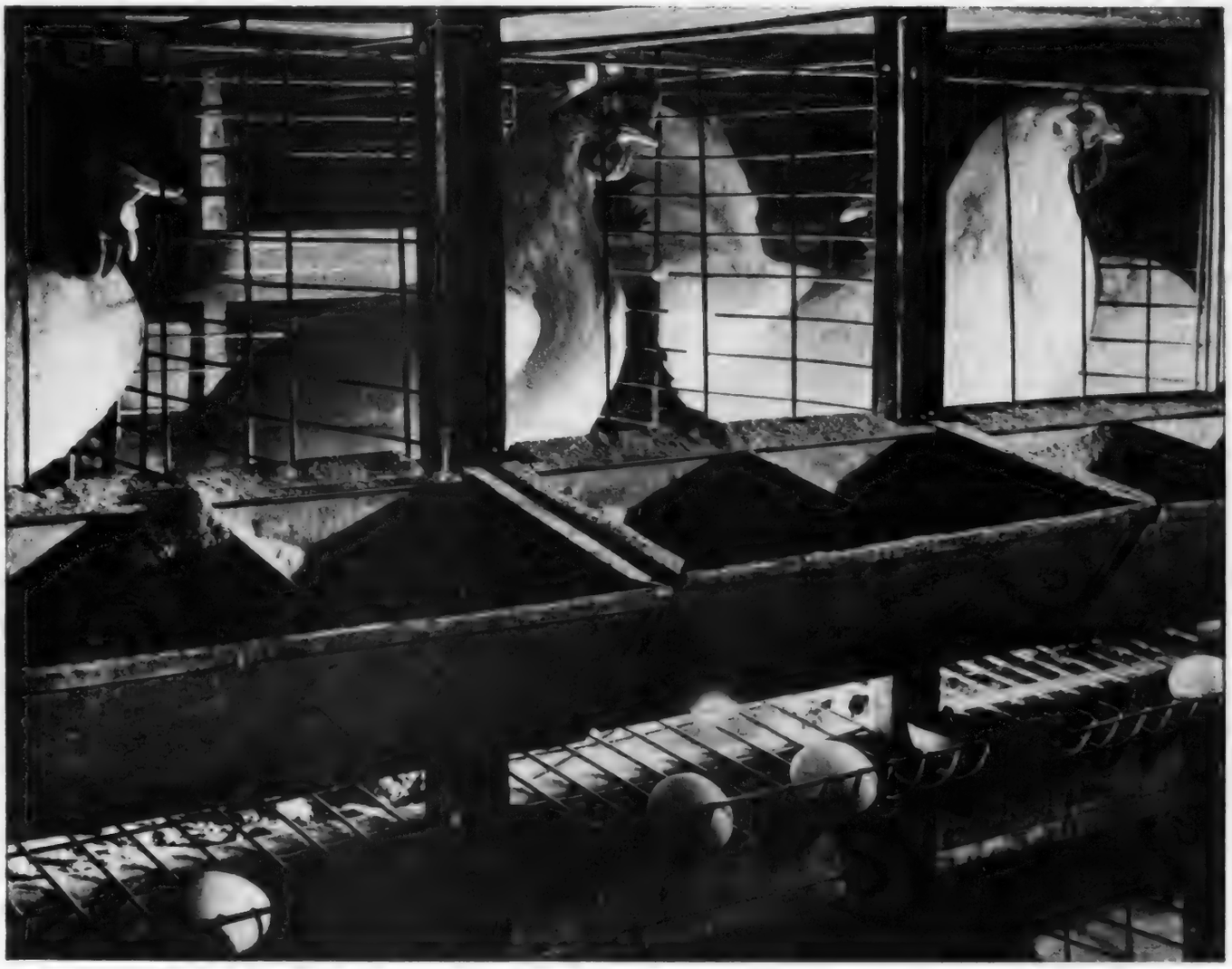
Comparisons are sometimes misleading. Animal nutrition specialists from a number of state agricultural schools, Illinois, Kentucky, Purdue, Pennsylvania and others, have tested distillers grains and solubles on all stock and in many combinations, and report that they can hold their own with any protein supplement made. The vitamin and amino acid content is high and mineral and fat satisfactory. They do have a component, peculiar to them and apparently lacking in some other protein supplements, an unknown growth and "tone" ingredient not yet isolated but known to be present. This, the scientists say, comes from the yeast used in the fermentation process. Growers say it adds a "mellowness" and "condition" to beef cattle; poultry raisers say their birds grow faster and the eggs hatch better; hog men say it increases litters and makes young pigs friskier and hardier. The secret of this unknown factor is thought to be locked up somewhere in the cosmic number of variations possible in the amino acid compounds.

The distillers are not selling grains and solubles as economy feeds. Rather they stress the quality as a conditioner to put on extra finish on high grade market and show animals. The average farmer, as well as the breeder of fine show stock, can use this added finish to his profit. His check from the stockyards will reflect it. Average bulk prices at the distillery are as follows: solubles, $80.00 per ton; dried grains, $65.00 per ton; one distillery prices a fortified soluble at $125.00 per ton. Freight charges of about 35 cents per hundred are added for New York and Wisconsin and points of comparable distance from the distilleries.

No fair comparison of costs can be

THE BEST QUALITY DISTILLERS FEEDS come from a mash bill high in corn. This mash bill contains 60 per cent corn, 28 per cent rye, and 12 per cent barley malt. Two piles on right are Light Grains and Solubles, one third by weight of the mash bill.





THE SOLUBLES, being low in fiber, are best for poultry. They replace expensive milk products and all the vegetable proteins. Tests show hatchability is increased and growth and health stimulated by the Solubles.

made between distillers feeds and cottonseed meal, soybean meal, corn gluten meal and others because their functions as supplements are different. Each fulfills a definite requirement in a livestock or poultry ration.

A comparison with dried skim-milk is a fairer comparison, for one is a substitute for the other and the nutritional values of the two are about the same. On a nutritional basis, six pounds of distillers dried solubles are equal to five pounds of dried skim-milk. Dried skim-milk usually runs eight to ten cents a pound over the cost of a pound of solubles. The use of solubles would result in a saving of more than 50 per cent.

The Bugs In The Stillage

Like most stock feed ingredients, distillers feeds do a better job in a combination with other supplements, and as a supplement to grain and forage. One of the reasons why this is true is that distillers feeds and grains and solubles do not in themselves make a balanced ration. Another reason is that when fed alone hogs sometimes find them unpalatable. Hogs may prefer corn to some solubles and when the two are fed together they will in some instances sort out the corn meal and waste the solubles. There are a number of ways to induce them to eat the solubles. A small amount of soybean meal not only makes the whole ration palatable, but fills out the supplement.

Hogs will sometimes eat more than is necessary of soybean meal; this calls for something to cut down palatability. On the other hand, cattle find the grains and solubles highly palatable. Cattle like the sour flavor of lactic acid; hogs are not as enthusiastic about it.

Wet stillage sometimes causes bloat in cattle, especially when it is fed straight. This the cattle feeders remedy by feeding a minimum amount of forage, say 10 to 15 pounds per head per day with the stillage. Thirty gallons of stillage plus 15 pounds of chopped hay per day per steer put on better than 1¾ pounds per day on an experiment farm at Frankfort, Kentucky. The feeding of hay also slows down the passage of the stillage through the animal and he gets more nourishment out of it. The forage need not be high quality, although the higher the quality the better the ration. If a high quality forage is fed the vitamin A requirement is usually met. Because of the lactic acid, limestone should be included in the supplement. Corn cob meal, stover, straw, or cottonseed hulls have been used with success. Wet stillage is best for growthy steers. Since it is a bulk feed, a great deal of it must be consumed to meet the animals growth and fattening requirements. Calves and young steers do better on a more concentrated ration. Cattle do best when fed the dried grains and solubles with a forage or grain supplement, and/or with small amounts of other protein supplements to improve ration balance.

Farmers sometimes, from necessity, or lack of information, feed straight distillers feeds to hogs. This is not recommended. Hogs fed a straight ration of distillers feeds will not reach top condition. They will be "soft" and will not dress out well. The addition of an animal protein supplement, such as fish meal, tankage, or meat scraps, will balance the ration and

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Do Hogs Need Milk?

BY W. E. LYNCH

AN old proverb that says, "Feed a pig and you'll have a hog," leaves a lot of questions unanswered. The most important question is what to feed the pig to get the hog and get him as fast and cheap as possible. Hog raisers aim at sending 200 pound hogs to market in six months or less, for the faster they can get them to market the greater the profit. This goal spurs on a constant search by farmers and research men for new feeds and new methods of serving them.

Just recently there's been a lot of talk on new ways to feed milk. Milk, one of the oldest feeds, is one of the best a pig can find in his trough, but it's always been regarded as too expensive for quantity feeding. Can a farmer afford to give his hogs milk? Generally speaking, hog experts say the answer is "yes." For instance, the cost of producing pork on corn alone under ideal conditions may be as low as $12.00 a hundred; on corn and tankage two dollars can be knocked from this figure; on corn and a 40 per cent supplement, and semi-solid buttermilk, pork can be produced at a cost of about $8.50 per 100 pounds.

Whether or not it pays to feed milk depends on: (1) the form of the milk feed, (2) the price of milk, (3) the market price of pork, (4) how the milk is fed and what other feeds are offered with it, and (5) the efficiency of other management practices such as sanitation, breeding, and farrowing care.

Milk is a good source of proteins, but for protein alone it would be cheaper to buy tankage. Milk, however, has more to recommend it than its protein content. It is rich in vitamins which help guard pigs, especially young ones, against disease. Pigs gain faster when they get some milk than when they get none. Milk-fed hogs are generally more vigorous and better able to throw off the attacks of parasites. And, because milk enables a hog to make better use of his other feeds, pork can often be produced at less expense than it can when the animals get no milk.

Any milk by-product has some feed value for a hog. Farmers who live near cheese plants haul the whey back to their hogs. If they sell cream the skim-milk goes into the hog trough. From nearby creameries they buy buttermilk, skim-milk, or mixtures of the two called "pig milk" at prices ranging from five to ten cents a gallon. These sources of milk feeds, however, are widely scattered, and only farmers who live near large dairies can profit by them.

Within the past few years, however, milk feeds have been easier to get. Creameries and cheese plants are processing their by-products and selling them to farmers. Now, instead of letting skim-milk and buttermilk run down the ditch behind the plant as they once did, these products are processed, packed in barrels and cartons and shipped out to feed dealers across the country. This type of merchandising has

brought milk by-products to the neighborhood of any farmer who cares to feed them.

Now, farmers like Herman Franklin of Montgomery County, Indiana, who raises 250 head of purebred Durocs each year, are able to buy milk products by the barrel or the ton. Franklin says, "Semi-solid buttermilk is the best conditioner I've found for growing pigs. I teach them to eat it when they're still with the sow." Whey, he adds, "is a good feed too but my hogs don't seem to eat it as well as they do buttermilk. I like to feed milk to hogs because with it I can get the same results on much less corn."

What is it that makes milk such a valuable supplement to a corn diet? Various experiment stations and agricultural colleges have taken a close look at the question and come up with a surprising answer. While it is true that milk helps keep hogs thrifty, the big benefit is that while consuming milk they can utilize more of the protein present in grain feeds. When hogs get corn alone they can turn only about 30 per cent of the protein in the corn into pork. However, they utilize 68 per cent of the protein in milk. When milk and grain are both fed they get the benefit of 68 per cent of the protein in *both* the milk and the grain. This means that milk, fed with corn, about doubles the value of the corn.

E. V. McCollum, while working for the USDA, learned that cereal grains are an incomplete feed for hogs, and when fed alone will not support an animal in growth or maintain his health. Corn lacks calcium and has poor quality protein. Not even a combination of grains make good feed without help. To complete the ration there should be high quality proteins and minerals. Dr. McCollum pointed out that grazing animals supplement their grain feeds with green plants, but for feeding hogs, especially hogs on poor pasture or no pasture, milk and its by-products are the best supplements obtainable for the grain feeds. The protein in milk feeds is high quality protein, and while it may not be present in such quantities as in other protein feeds, milk protein is almost entirely digestible.

SKIM MILK, once wasted at the creamery, now goes back to the farm as a first rate hog feed. Milk can replace other protein supplements for fattening hogs.

THIS LUNCH WAGON for hogs, on Conner Prairie Farms, Nobelsville, Indiana, has a tank for buttermilk, and a bin for grains. Grain and milk are mixed and fed as mash.

Skim-Milk

Farmers who have an abundance of skim-milk on the farm need feed no other protein supplement to their hogs. The old rule of thumb is that 100 pounds of skim-milk is equal to a half bushel of corn. If skim-milk can be purchased at local creameries at five cents a gallon, the cost of 100 pounds will be 62½ cents. If corn is selling at $1.25 a bushel, the cost of producing a pound of pork with milk

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Rabbit raisers who don't like butchering their animals can raise Angoras. There is a new cash wool crop every 10 weeks.

Angora Rabbits

BY M. PRISCILLA CARLSON

ANGORAS can be goats, cats or rabbits. Mine are rabbits. Angora has always been the aristocrat of wools. Its warmth and lightness, for it is three to six times lighter than sheeps' wool, depending on its use, make it excellent for outdoor wear. The fact that it is non-irritating to even the most sensitive skins makes it ideal for the extra warmth needed by babies and the victims of rheumatism and arthritis. Angora rabbit breeders have no trouble finding markets for the hair their animals produce.

My introduction to Angoras was through a magazine article which I inherited some years ago with a furnished apartment.

Here was an animal producing a continuous profit without any routine butchering. It could be profitably raised in a limited space, with a small capital investment.

They were gentle, noiseless, and when properly cared for, odorless. The work involved was light, and there were no marketing problems involved, as wool for shipment was taken to the nearest post office. In a few days a check returned from a marketing agency.

Angoras have a long history. During the days of the Medes and Persians, 700 years B.C., they were called Silk Rabbits. More recently, during the 17th century, the Turks domesticated them, and learned to fashion their wool into expensive shawls and rugs. French sailors on leave in Ankara (then Angora, from which these animals take their name) purchased a few of the long haired rabbits to take back to France. Shortly, Angoras were being bred in neighboring European countries, in Japan and in England, where the British developed a breed somewhat different in appearance and fiber texture. Today only two breeds of Angora rabbits, French and English, are recognized by the American Rabbit and Cavy Breeders Association, although there are many supporters of the theory that the ideal Angora is a cross of these two, and will eventually emerge as the American Angora.

Some 40 or 50 years ago a few were imported by fanciers, to be displayed as novelties or sold as pets, but until recent years there was little commercial breeding in this country.

Pioneer breeders were a hardy, far visioned group. There was no literature on Angoras, no government help obtainable, no marketing services. The breeder operated by trial and error. The picture today is quite different. There are now ten to fifteen thousand breeders in the country, scattered from border to border and coast to coast. The government maintains two experimental stations which are working with Angoras. Both publish bulletins. Angora co-operatives and specialty clubs make it easy for the beginner to meet breeders and visit the rabbitries in his vicinity.

A complete article on rabbits in the Summer 1947 *Farm Quarterly* gave much information that applies to Angoras, but dealt mostly with meat and fur rabbits. Let's take up where it stopped and complete the picture on Angoras.

When I began to search for a pair of

FOR CLIPPING wool, an Angora is harnessed to a small table. After his underside is clipped he is turned and his back is sheared. The job takes B. E. Burgess, Mt. Vernon, Ohio, 10 minutes with an electric clipper. The rabbit may be unhappy but is not hurt.

Angoras I turned first to local farmers. I found no Angoras.

Pet shops were next on my list. I refused innumerable Persian cats. Eventually I visited a local man who raised meat rabbits. He had four Angoras, the first I had ever seen. He was willing to sell me one buck and one doe. In the spirit of the day they were christened Victory I, and Miss Liberty. I was suddenly confronted with the problem of what to do with my new acquisitions, and a wire enclosed doghouse was pressed into service as a hutch. Victory I settled down contentedly but Miss Liberty ranged her pen in discontent and bad temper, growling like a dog, a trait which may have been suggested to her by her surroundings. Of the thousands of rabbits which we have kept since she was the only one with a bad disposition. As I learned more about Angoras I realized that while Miss Liberty was part Angora, somewhere in her past, indiscreet ancestors must have met and mated with Flemish Giants, New Zealands, and possibly English bull dogs. She refused all Victory's persuasive attentions, remaining a soured spinster. She produced neither wool nor offspring. She was the first of our Angoras to go from hutch to table.

Her refusal to breed was fortunate for me. A herd based on her offspring could have brought only disappointment and failure. Victory, however, was a thoroughbred. His descendants still carry his fine head, lively wool and royal furnishings.

The dog house served reasonably well as a temporary shelter, but good hutches seemed a must. A sympathetic brother agreed to "help" me build my first hutch. We built a three rabbit hutch of tongued and grooved redwood, probably the most expensive and beautifully constructed hutch on Long Island, but hardly a model for sound economic Angora farming.

Housing Project

The difference between good and bad hutches can be the difference between success and failure in Angora breeding. A good hutch must have a minimum of four square feet per animal, and a minimum height of 20 inches. It must have a floor of wire or other material with openings sufficiently large to permit droppings and litter to fall through, but with a mesh small enough to prevent injury to an animal's feet. It must have no ledges or projections to catch and hold litter, and be constructed to provide the rabbit with plenty of fresh air and sunshine while affording protection from storms and drafts. We still use hardware cloth flooring, but the rest of the hutch is turkey wire, and is hung between two uprights. The bottom is about three feet from the ground to facilitate cleaning. A tarpaper shell gives winter protection above and on three sides. Each hutch unit is eight feet long, two feet six inches deep, and 20 inches high, and is partitioned for four rabbits.

Construction to eliminate door openings for feeding is important. With two bunnies, opening a door is a trifle, but with a thousand it's an impossibility. Dishes and hay racks either set in the door or fastened securely just inside save labor, time and money.

What They Eat

The basic feed for Angoras is whole grains—oats, wheat, barley, a protein supplement, usually soybeans in some form, alfalfa hay, fresh roots, greens, and salt. Compared to the larger breeds of rabbits they are economical to feed, requiring a total of only three or four ounces of food a day. The pellets or grain mixture usually cost about five cents a pound. Costs vary somewhat in different localities, but by feeding fresh greens twice a week during growing months we find it costs us approximately a penny a day to maintain a wooler. Commercial pellets which are designed to add flesh rapidly, are not the best feed for Angoras. A fat Angora is usually a poor wool producer. Most breeders solve the problem by mixing whole wheat or oats with a complete commercial pellet. Contrary to an old belief that rabbits need no water, they require fresh water daily, twice a day in hot weather so they have water at all times. Salt must also be included in their diet, either mixed in their feed or in the form of salt spools that can be hung inside the hutch. Young rabbits begin leaving the nest when about three weeks old, and although they'll nibble almost at once on mamma's whole grains, the results obtained by supplemental milk and cereal feedings have proved well worth the expense and trouble. Angoras should be fed once a day, either morning or evening, depending on which is more convenient for the breeder.

Based on our own experience, a husband and wife can care for around one thousand rabbits, netting between three and five dollars a rabbit annually from the sale of wool, meat and manure, and still have time to do a lot of living. I don't mean that every urban couple with a yearning for a little place in the country can buy an acre of land, a trio of Angoras, and relax by the fire with a good book while their Angoras make them wealthy.

There is still a scarcity of good breeding stock. Animals may be available for sale by a newcomer, who by luck or default has won a ribbon at a show. Competitive shows are an excellent form of education for both the breeder and the public, but the rabbit who won a first, may be a fancy only, that is, pretty to look at, but one that a commercial breeder would cull for inadequate production. Also, a rabbit that wins a blue because he has no competition isn't necessarily superior. When a handful of gay ribbons is displayed as guarantee of

THE HARVEST is in. A good wooler produces about a pound of hair a year, worth up to $8 a pound. The seven commercial grades of Angora wool are based on length, cleanliness and amount of matted hair.

high quality stock, a check with the secretary of the shows at which the wins were made might be revealing. If there were 40 or more entries by a dozen breeders, the man who won Best of Breed probably has good stock.

Then there is the breeder who has never bothered to keep records because he considers them a lot of time consuming nonsense. He will tell his prospects either one of two things.

1. "You can't make any money with Angoras. I keep mine for a hobby, but I spend six hours a day caring for them." (He's the man with 100 rabbits who opens all the doors two to four times a day to feed and water, who has constructed his hutches so that cleaning is a back-breaking chore.)

2. "There's a fortune to be made in Angoras. Takes me about 20 minutes a day to take care of 'em." (He's the man with 100 rabbits who never bothers to clean his hutches and feeds at his convenience.)

Somewhere in between is the intelligent, business-like breeder with anywhere from 25 to 2,000 Angoras, who knows to the penny how much he has spent for stock and feed, hutches and equipment, and exactly how much he has realized for his wool and other products. He plucks or clips on schedule and cleans regularly. He keeps a complete record on every animal from the day it is born, weighing its wool in such a manner that he can determine to a sixteenth of an ounce what its production is in each of the seven commercial grades. Weighing the animal before and after plucking is a fairly standardized method of arriving at production figures, but seems inadequate for the selection of breeding stock. That method gives a fairly true picture of total produc-

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SUGAR BEETS

BY RICHARD E. STOCKWELL

Machinery is taking the hand work out of sugar beet growing.

This ancient plant is now an important farm money maker.

THE average American has such a sweet tooth that he eats the equivalent of a 100-pound sack of sugar each year. His sack of sugar could be extracted from sugar beets, sugar cane, palm trees, maple trees, watermelons, or a long list of other plants. Actually it comes mostly from cane and beets. Regardless of the source, pure refined sugar is the same. Maple sugar has its distinctive flavor only because it contains products other than sugar. Pure sugar from any source is a white, sparkling solid.

To help keep sugar on the American table farmers in 22 states grow sugar beets on a million acres of land each year. Sugar beets supply about one quarter of the sugar we use.

It has taken the sugar beet more than 100 years to climb to its high spot on the list of important American farm crops. The old Romans knew that certain types of beets contained sugar. Nothing was done about it, however, until 200 years ago when a German chemist proved that the sugar in beets is the same as the sugar in cane. It was another 40 years before a substantial amount of sugar was extracted from them, but this launched the sugar beet on an important career.

In 1838, near Northampton, Massachusetts, the first beet sugar was produced in this country. During the following years in Illinois, Wisconsin, and Utah, and other states effort to make beet sugar commercially failed.

To California goes the credit for the first commercial success with sugar beets.

The first plant built at Alvarado in 1870 is still in operation. Today there are 83 processing plants in Ohio, Colorado, Michigan, Minnesota, Utah, Idaho, Nebraska, Wyoming, Montana, Wisconsin, Iowa, Kansas, Washington, South Dakota, Oregon, and California. The bulk of our beets are grown west of the Mississippi.

Who Grows Beets?

You can grow beets if: (1) You are a careful farmer. (2) Your farm is near a beet factory. (3) Your growing season is long and moderately cool with a mean temperature between 67 and 72 degrees. (4) Your soil is both deep and rich. (5) You live in an area where there is 26 or more inches of rainfall each year or irrigation is practiced. (6) You are willing to invest from $1500 or to $5,000 in special equipment.

Sugar beets will grow well in soils testing either moderately acid or alkaline, though they have a preference for a slightly alkaline condition. If you can get a good stand of red clover or alfalfa on a field, you can probably get a good beet crop. If the soil is a little on the acid side, the nearby beet factory usually has waste lime that can be had at low cost, or lime can be purchased and added to the soil in accordance with the recommendations of the beet factory's agricultural agent or the county agent. Since beet factories use large amounts of lime in purifying sugar, they often have enough waste lime around to supply most of their beet growers.

"Sure beets require good soil," says one Utah beet farmer, "but they aren't soil robbers." Eight tons of beets (roots only) remove about as much fertility from an acre as a ton and a half of dry alfalfa or red clover hay, but unlike these plants, beets are unable to add nitrogen to the soil.

Experience shows beets do best on silt, clay, and clay loams. Most of the country's acreage is grown on such soil, though satisfactory yields may be obtained on sandy loams and even lighter textured sandy and gravelly soils. Beets may even be grown on muck, as in Michigan where large amounts of potash are added to make up this deficiency in muck. It would be well to test beets on a small scale on a muck field before planting the whole area, because some mucks don't give good yields and others produce beets low in sugar content.

Beets do well on the mineral soils of the Rocky Mountain states, especially if the humus content has been built up with green and barnyard manure to increase the water-holding capacity. The sugar beet is a thirsty root, and a heavy drinker.

Fall plowing assures a firm seed bed for early spring planting. If the field is covered with trash such as cornstalks, smart beet growers disc before plowing so the furrow slice turned under is fine and granular.

In the spring, after the soil can be worked without becoming compacted or cloddy, the field should be disced, then dragged with a spring-tooth harrow. A trip over the field with a culti-packer will break up clods and firm the soil. This last operation can be delayed a week or so to give weeds a chance to come up, then the field can be worked once more and planted immediately.

A properly prepared seed bed should be firm enough for a man to walk on without sinking in much over a half inch; yet, it must be mellow so the roots can make their way down through the soil.

If root penetration is limited near the surface by hardpan, plow sole, or a high water table, the beets may grow in freakish shapes. They should be long and tapered.

Planting

Unfortunately, the sugar beet seed is not a single cell, but rather a number of seeds held together in a hard, tight ball. When the seed germinates it sends up shoots from every cell. Beets must have "elbow room." They must be thinned so that single plants are spaced 10 to 12 inches apart in the row. For more than a decade scientists patiently attempted to breed a strain of beets having a single-celled seed that would send up only one shoot, but they met with failure.

It was only when genetics was discarded and engineering was tried that the problem was finally solved. In the late 1930's sugar beet processors in the United States made a grant to the University of California where an agricultural engineer, Professor Roy Bainer, took up the task of breaking the cells apart so that a single plant would emerge from each.

He built a machine, consisting of a rapidly spinning abrasive wheel and a shearing bar. When fed to the wheel the seed was thrust against the shearing bar, and the pressure caused a breakage of the seed ball along the planes of cleavage between the cells. About two-thirds of the segments that result from this process contain but one beet cell, while the remainder have two or more. Little of the germinating quality is lost in processing.

This seed is planted at the rate of five to seven pounds per acre, depending upon the variety and area. It would be well to follow the recommendations of the local beet factory on this. Factories sell processed seed for about 45 cents a pound to farmers who contract their beet crop with them.

Thanks to Professor Bainer, it is possible to plant single beet seeds at least two-thirds of the time. Six row, plate or rotor, beet planters put the seeds down

SPECIAL BEET PLANTERS will drop from five to seven pounds of seed per acre, an inch to an inch and a half deep. The plants must later be thinned to one for every 10 to 12 inches of row space. Beets on this Utah farm are watered by irrigation.

one inch apart. The older practice, still followed by a decreasing number of farmers, was to drill in a solid row, using 15 pounds of unprocessed seed per acre. This complicates thinning. Now, new developments in seed pelleting promise even greater efficiency in planting the proper number of seeds and cutting the costs of thinning.

The seed is planted one-half to one and a half inches deep. Early planting, which means late April or early May in most areas, should be on the shallow side because the top of the seed bed is warmer. Beets planted as late as the last week of May should be put in a little deeper to assure contact with moisture.

In that open-air hot house, the Imperial Valley of California, beets are planted in September or October and harvested in spring, while in central California planting is done between January and April.

Where beets are to be irrigated, planters are often equipped with ditchers to furrow the land so water will run between the rows.

Where beets are watered by the natural rainfall beet rows range from 18 to 30 inches apart, depending upon the amount of rainfall common to the area.

A frequent cause of a poor beet stand is crusting of the soil by heavy spring rains. Light harrowing may help break up the crust.

Varieties

By selective breeding the sugar content, growth habits, size and shape, and resistance to disease have been bred into the modern beet.

WEEDS make no sugar and keeping them down requires four to five cultivations each season. Cultivating 100 acres of beets is a full time job for one man and a tractor.

HAND HARVESTING is an expensive, back breaking chore. Where 20 men may harvest an acre of sugar beets a day, some two-row harvesters do an acre an hour.

There are hundreds of varieties of beets, and breeding work is proceeding so rapidly that no variety is very old. This year's varieties may not be with us next year. Each company has developed its own varieties and each spring the local factory supplies farmers with seed to make certain that they grow the varieties believed best for the locality.

Thinning

When beet seedlings reach the two to four leaf stage, it is necessary to thin them to one beet in 10 to 12 inches.

If they are allowed to become larger before thinning, yields decrease because of competition, weakening all the plants, stunting their growth and inviting disease.

In thinning, part of the row is cut out or "blocked," leaving small clumps of plants at regular intervals. The clumps are later thinned to a single plant. When processed seed is used and is put down an inch apart, each block will have only one or two seedlings.

For generations "blocking" has been done with a hoe. Now most farmers use mechanical blockers which are pulled down the row, cutting off all the beets except those in a tiny space every 12 inches. Processed seed planted an inch apart may be blocked or thinned merely by cross-cultivating the field, which is an enormous saving in labor.

When blocking is done by hand, growers hire the extra "hands" at a contract per acre price, which has been determined by the United States Department of Agriculture. Usually beet field workers are migrant laborers from the Southwest or from Mexico.

The shortage of such labor and high wages during the war forced many beet growers to cut down the hand labor for thinning and harvesting. Some of them, using processed seed, began to thin their fields by cross-cultivation. Some had workers go over their fields later, and with a long-handled hoe "pretty up" the blocks that needed it. Others didn't go that far, but did reduce their labor costs by thinning their beets with long-handled hoes only instead of employing the time-honored practice of having one worker block out the row with a long-handled hoe while a second worker followed him on his knees, using a short-handled hoe to clean up the blocks.

Some surprising results were obtained from the use of these various methods during the war. It was discovered that costs could be reduced while yields stayed up when beets were cross-cultivated and no hand labor at all was used. Thinning by hand costs from $20 to $40 an acre.

As early as 1942 the Colorado Agricultural Experiment Station carried out tests on a 30-acre beet field near Fort Collins to find out how mechanical thinning compared with hand thinning. Here are the results:

BEET FARMERS have two sources of income from their beets. The root this farmer holds will bring him cash at the processing plant. The tops will be fed to his stock. The average beet weighs from two to two and half pounds, but some have weighed 32.

Method	*Man hours per acre*	*Yields in tons per acre*
Cross cultivation only....	2.45	12.24
Cross cultivation followed by hand thinning of blocks with a long-handled hoe.....	11.6	11.40
Long-handled hoe thinning only.....	15.6	11.47
Long-handled hoe blocking followed by short-handled hoe thinning	27.2	12.17

There are two reasons why mechanical thinning or cross-cultivation often produces as high a yield as hand thinning. First, since cross-cultivation is faster, all the beets are thinned "on time." Second, sugar beets tend to spread out and use plant food from vacant places or "skips" in mechanically thinned rows. The beets on each side of a skip or near to a skip in adjoining rows grow larger than if the skip were not there. This is a big factor in final yield and helps compensate for the greater number of skips and doubles left by cross-cultivation as compared with hand thinning.

H. M. Trowbridge of Comstock, Minnesota, who had 150 acres of beets in 1948, says: "We have gone a long way toward mechanizing the growing of beets in the past ten years. Most of our beets are cross-cultivated and more and more people in this area do no hand thinning at all."

When beets are planted the usual practice is to put fertilizer into the ground with them in the same manner as with corn. However, in recent years beet growers have adopted the practice of side-dressing their beets with still more fertilizer after they have been thinned and cultivated once. Last year about ten per cent of our total beet acreage was side-dressed and growers realized added returns of from $2.00 to $10.00 per acre. The usual practice is to apply 150 to 200 pounds of fertilizer per acre by drilling it in about five inches from each side of the row to a depth of four inches.

Fertilizers should be adapted to local soil needs and the agricultural expert at the nearest beet factory, or the county agent, will know what these needs are.

Beets should be cultivated as often as necessary to keep weeds down, usually four or five times during the season.

Irrigation

In many beet growing sections, rainfall is so light that the beet fields must be irrigated. The average field of beets uses from three to six acre inches of water per irrigation and will normally require five to ten irrigations during the growing season, depending upon the type of soil, rainfall, water table and evaporation. Although sugar beet roots normally will penetrate the soil to depths of six feet, most of its feeding rootlets are in the top foot of soil.

The sugar beet obtains about 65 per cent of its water from the top foot of soil and another 20 per cent from the second foot. Keeping the top foot moist is the most important factor in irrigating beets. That means light irrigations at about ten-day intervals. If too much water is used soluble plant foods are leached out of the soil.

The field should be irrigated when the soil begins to lose its friable condition. The beets should not lose their fresh green

LOOK, NO HANDS! Mechanical harvesters which cost about $2500 top the beets, lift them from the ground, shake the soil off, lift them to a hopper and dump them in a truck. Agricultural engineers are still not satisfied with them.

THE LAST MILE for these hand harvested beets is a truck trip to the factory. The grower will be paid according to the sugar content of all beets in his area.

appearance. They need water when they fail to recover from mid-day wilting by early evening.

Pests

One of the most serious diseases beets have had in this country is leaf-spot, characterized by brown, dead spots with ashen-gray centers. Sometimes the spots become so numerous the infected leaves die. Plant scientists are now busy developing new leaf-spot resistant strains which are already available.

Curly top, caused by a virus, is a serious disease in the mountain states. It forced virtual abandonment of the sugar beet crop in Idaho, Washington, and Utah during the 1920's. As early as 1913 government plant breeders began to select for curly top resistant plants, and by 1929 they had achieved enough success that it was possible for beet growing to return to the areas where it had been driven out. Subsequent improvement in curly top resistant strains has reduced the disease to only a minor problem in the three states.

Among insect pests, nematodes are serious. It is all but impossible to raise a paying crop of beets when these tiny worms are present in the soil and work themselves into the beets.

The best control is crop rotation. Growing of alfalfa, corn, beans or small grain over a period of five years in a field will reduce its nematode population, since they do not feed on these crops.

Alfalfa or sugar beet webworms may occasionally appear in large numbers and eat the leaves of the plants. Paris green applied at the rate of four or five pounds per 100 gallons of water per acre will control them.

Grasshoppers and cutworms, which sometimes become serious, can be controlled with poison mash, and flea beetles, blister beetles and wireworms which occasionally become serious will succumb to pyrethrum dust.

When he runs into a serious insect or disease problem, it is wise for the grower to consult the experts at the beet factory, or go to his county agent.

Harvesting

Mechanization has speeded up the harvesting operation as well as thinning, especially in the irrigated areas where today about 85 per cent of the crop is harvested by machine. Across the nation about 65 per cent of the total sugar beet crop is mechanically harvested without a hand touching the beets.

Harvesters are more common in irrigated areas because it is possible to control the moisture and so aid the machine in its operation. In the non-irrigated areas it often is too wet or too dry for the machinery to work efficiently. Attempts are being made to breed a turnip-shaped beet that will pull more easily, and so simplify mechanical harvesting in all areas.

(Continued on page 109)

AFTER THE PROCESSING PLANT has taken the sugar from the beets, the pulp is turned into livestock feed. Farmers haul it back home for silage. Beet pulp silage is palatable and contains high quality carbohydrates. Because it is low in protein and phosphorus, it is usually fed with alfalfa hay which helps correct the deficiencies.

Put The Air To Work

Crop drying permits early harvesting, keeps the rotation going, and prevents storage losses.

"Each fall there is a short period when the corn is just right for picking, green enough to go through the picker without a hitch and dry enough for safe storage. This critical period lasts for about 20 minutes, and usually the farmer is home for lunch when it happens," so says Roswell Garst of Coon Rapids, Iowa, and he should know for, next to his wife and kids, corn is his great love. He raises it, sells it, talks about it, studies it, and believes it is the greatest plant on earth right down to and including the cob, which he feeds to his cattle.

"The same thing is true of the small grains and grass seeds," Garst continues, "if you harvest them too early, they heat and spoil. If you wait until they dry to a safe 14 per cent moisture content, they shatter and you lose some of your crop. And when it comes to hay, we've found that it loses around 35 per cent of its feed value when cured in the field."

Moisture, as Garst points out, is one of the bugaboos of the harvest season. During normal years there is bound to be some loss either from harvesting too soon, when the wet grain will heat and spoil, or too late when it will shatter. During abnormal years the farmer really takes a beating. Too much rain and humidity may keep his wheat and other small grains standing in the field long after harvest time until he threshes the damp grain in sheer desperation. Then there are years, like 1948, when the lack of a hard frost left farmers in many parts of the corn belt with soft corn on their hands. Corn, which was too damp for storage and a government loan, was dumped on the market for as low as 60 cents a bushel at a time when the government was making price support loans of $1.40 or better on dry corn. The lucky farmers that had stock to feed did better, but even these unfortunate ones had to feed their corn a lot faster than they normally would to use it before it spoiled.

To minimize the shattering of oats, barley and many of the grasses, careful farmers have tried cutting it on the green side and leaving it in windrows to dry. When the crop has dried they go through the fields with a pick-up attachment on their combine and thresh it. This has done away with much of the shattering, but you can still pick out the location of the windrows a little later by the green carpet made by volunteer seed. Beside this loss there is the cost of an extra operation.

Corn, during normal years, is left in the fields until frost has stopped the sap from moving upward into the ear and given the grain a chance to dry. As everyone who has acquired a pair of swollen wrists from corn husking knows, you can pick and husk corn a lot easier after a hard frost. The mechanical pickers, however, do their best work when the corn has around 20 to 25 per cent moisture. If the corn is allowed to get dryer they do a poorer job of husking and will shell out some of the grain. Then too, there is a loss of ears from corn that is left to stand in the field which the U. S. Department of Agriculture has estimated to be as high as 10 per cent for corn left until November 20. And finally, if the farmer waits for his corn to dry normally, it may be too late to plant winter wheat after the corn is off the land. If he is to keep up any kind of rotation, he will probably plant oats in the spring, a disheartening thought when oats are bringing less than half the price of wheat. Waiting for his corn to dry naturally may even keep him from doing his fall plowing on the corn land which throws more work to spring and gives the corn borer a chance to thrive in the old stalks. But the fact remains, grains cannot be stored safely if they are wet.

The ironical part of all this is that the crops gain nothing by drying in the field. Once they have ripened their feed value remains exactly the same while their moisture content slowly decreases and their tendency to shatter reaches the disaster point.

The Solution — Crop Dryers

"The answer to this problem is to harvest your corn when it contains from 20 to 25 per cent moisture and will run through a mechanical picker like a breeze, and to combine the standing grain and grass before shattering while it is still on the tough side," Garst says, "and then remove the excess moisture artifically.

"We have been doing it that way on both corn and small grain and it works," he adds. "We start combining oats about a week before our neighbors; we are going before they even start windrowing.

We also found that we could lengthen the working day by getting our combine onto the field early in the morning before the dew had dried and working into the evening when moisture was beginning to form. It didn't matter to us since we were going to dry the whole crop anyway; all we did was to keep the combine adjusted so that it operated at its best through the different moisture conditions."

Garst was able to do the same thing

← **MOLDY CORN IS A DEAD LOSS. Caused by moisture, it can be prevented by drying the crop to a safe storage condition.**

REQUIREMENTS FOR CONDITIONING AND STORING FARM CROPS

		Ear Corn	Shelled Corn	Wheat	Barley	Oats	Sorghum	Soy-beans	Baled Hay	Chopped Hay	Long Hay
BULK STORAGE REQUIREMENTS	Maximum moisture content of crop for satisfactory drying in % W. B.*	30	26	18	20	20	20	20	45	50	50
	Maximum distance of air travel permissible for bulk drying.	20′	8′	8′	8′	10′	8′	10′	7′	12′	14′
	Maximum moisture content of crop for safe storage in tight structure in % W. B.*	15	13	12	13	13	12	11	12	12	12
	Maximum allowable relative humidity of inlet air for drying in %.	75	63	60	65	70	60	67	55	55	55
Average Outside Air Conditions in the Corn Belt for the Month Following Harvest	Temperature Dry Bulb—degrees Farenheit.	50	50	75	75	75	50	50	75	75	75
	Relative Humidity in %.	70	70	60	60	60	70	70	60	60	60
OPTIMUM REQUIREMENTS FOR BULK DRYING—(Average Weather Conditions)	AIRFLOW—Amount cubic feet per minute per bushel.	7	4	2.5	3.5	3	4	4	1.5**	1.5**	1.5**
	Resistance in. H_2O / ft. depth***	.15	.30	.30	.40	.50	.50	.25	.06	.12	.10
	INLET AIR CONDITION—Temperature Rise—degrees Farenheit.	60	20	14	15	15	20	20	30	20	20
	Relative Humidity in %.	10	36	40	38	38	36	36	25	35	35
TIME	Number of hours required to dry 2,000 bushel from maximum moisture content for drying to maximum for safe storage in tight bin under average weather conditions at optimum requirements.	96	220	194	126	106	130	170	150	180	180

* Wet basis. This is the basis used by elevators in determining moisfure content.

** Air flow in cubic feet per minute for each cubic foot of hay.

*** Ask your son who has taken High School Physics to explain this one.

This chart is one of the results of a long term study on crop drying made at Purdue University. In 1943 the Armco Steel Corporation, of Middletown, Ohio, became one of the first industrial concerns to sponsor studies on this problem by establishing the Armco-Purdue University Fellowship to investigate the functional requirements for conditioning and storing crops. The information that has been gathered has been made available to the manufacturers of crop drying and conditioning equipment and Armco itself has used the findings in designing and producing its storage-drying building.

with his corn crop, harvesting it at a time when the mechanical picker would do its best job with the least time, shelling it out, and drying it artificially to put it in good condition for sale or storage. And his crop was harvested in plenty of time to plant winter wheat.

Besides oats and corn, crop dryers are being used to lower the moisture content of wheat, barley, soybeans, grass seed, and hay. Perhaps the list should be reversed, for hay was one of the first crops to receive the on-the-farm drying treatment. It has been dried in long form and as chopped hay and even when in bales, though drying baled hay is not so economical since it takes considerably longer and presents a problem in forcing the air through the tightly packed material.

The Blower

The principles involved in crop drying are rather simple. Heated air is forced through the crop, absorbs the excess moisture, and carries it away. This basic idea has been used for years by grain elevators and seed houses. The elevators operate huge, continuous flow dryers which move corn and other grains through a blast of heated air at a rate of speed that will bring the grain out the other end with less than 15 per cent moisture. Large batch dryers are also used commercially. Here the grain or seed remains stationary and heated air is blown through the batch to dry it. The new idea is to work out a batch dryer that can be used economically on the farm itself. This requires a dryer unit to blow the heated air through the grain, and a properly constructed drying chamber where the grain is stored during drying.

The crop dryer uses a fan to force the air through the grain in sufficient quantity to insure quick drying and heats the air to lower its relative humidity and make it a more efficient drying agent. Heating the air is like wringing out a sponge, after heating it can absorb more moisture than it could before. Unheated air will, eventually, dry the crop, but it has been found that the cost of heating is more than equalled by the extra cost of running the blower for the longer period. With unheated air there is also the danger of some of the grain spoiling before it is dried to the safe storage point. For this reason most of the crop dryer units that are on the market use some device for heating the air before the fan blows it through the grain.

There are two types of heaters in use. The first has an enclosed fire pot that heats the air passing around it without allowing the air to come in contact with the fire itself or the fumes from the burning oil. The second type has a flame located in the stream of air that is then blown into the grain. The first type is considered the safer of the two, but it does not put out as much heat or heat the air

(Continued on page 112)

THE SWINDLE BOX is the farmer's name for a moisture tester. He can have his drying grain tested for moisture at the country elevator and avoid over drying.

THE MOBILE DRYER can be wheeled up to any building that has been converted for drying. The canvas duct carries heated air into the chamber between the floor and a false, slotted floor, which allows it to pass upward through the grain.

Sweet are the uses of adversity,
Which like a toad, ugly and venomous
Wears yet a precious jewel in his head

—Shakespeare

Toads Are Always Hungry

IF YOU are lucky enough to have a hop toad in your garden, protect him and treat him gently, for he is one of your best friends. As he sits in the shade of a cabbage leaf, blinking his sad eyes, he seems to be thinking of the injustice of the Gods who designed him. Beneath that drab, warty hide there beats a gentle heart, a heart that warms at the sight of man, and draws him into companionship with the human family.

Poets have reviled him, calling him the ugliest of all God's creatures. Small boys have been told that he causes warts; superstitious people believe that if he is crushed under your heel your cow will give bloody milk. This is slander, for the toad is the gentlest and most harmless of animals.

There are two kinds of hop toads that inhabit the fields and gardens of the Midwest, and they look much alike. Technically, they are the Fowler's Toad and the American Toad, but their designer made them from the same pattern with only slight variations. Toads are amphibians, which places them between the fish and the reptiles in the scheme of nature. The early part of their lives they live in the water with the aid of fins and gills. Later in the season they take to the land where they breathe with lungs and move with legs.

The spring peeper who adds his persistent call to the evening music is not a toad, but a tree frog. Unlike the hop toad, the peepers can climb. They climb cattails and bushes, trees and fence posts where they feed and sing. They may even climb up the screen that covers the living room window and there busy themselves capturing the moths and mosquitoes that are attracted by the lights inside.

Toads are related to frogs but the frogs are more streamlined, and, one might say, prettier. A frog can jump better than a toad; the toad has no ambitions along this line. He's usually too full of worms and bugs to make a good jump. They have much in common, especially in the spring when the first warm rains bring both out of hibernation. They organize themselves into symphonies and singing societies and give concerts, which begin each evening as the sun goes down. During

the day one may hear an occasional solo.

These concerts have a place in the memory of farm boys along with the steamboat whistle on a far-away river, or the call of the whip-poor-will from the woodlot on a quiet summer night.

Bull frogs sing bass; the peepers come in with the soprano and the toads offer an in-between, plaintive sort of note. It is only during the breeding season that hop toads do their best singing. The rest of the summer they may come out with an occasional peep, but they spend most of their time eating, or thinking about eating.

Hop toads are born with bottomless stomachs. If there is an influx of mosquitoes, toads work overtime collecting them. They regard cut worms as a delicacy and those who have taken the trouble to investigate say that 16 per cent of the toad's diet is composed of these pests. Another nine per cent is tent caterpillars, while 19 per cent is weevils and other beetles. One toad's stomach contained 65 gypsy moth larvae. The toad experts tell us that an adult toad will eat about 10,000 injurious insects in three months.

The French have a great respect for, and understanding of, the toad. The French gardener is careful to locate his toads before he starts hoeing. As he goes from cabbage to cabbage in his search, he gives each toad a hearty greeting. "Good morning, Monsieur Toad," he will say. "I hope you have a pleasant day." If a Frenchman has no toad in his garden, he may buy one to help him fight the insects.

The hop toad is well equipped for his life work. His tongue is fastened at the front of the mouth rather than the rear, and he can flip it out at a passing fly too fast for the human eye to see. His range is about two inches, and unwary insects, although they may be just passing through, seldom escape if they get in the danger zone. Their fate is sealed and their end is fast. If you happen to be leaning on your hoe handle watching the toad pick off his victims you must let your imagination fill in those gaps which your eyes can't follow. A fly comes buzzing by in lazy fashion. He circles the toad's head. You see the fly, then you don't. The toad blinks; there is a slight ripple in his throat as the fly goes down, and his tongue is cocked for the next victim.

A toad's tongue comes complete with tangle foot. A sticky fluid covers his tongue and holds the flies, mosquitoes, beetles and grubs for that split second required for them to reach his mouth. A toad can hop down a row of beans and clean off every bug quicker than you can spray the row.

A toad seldom takes a second look at anything that might be food. He is not one to make slow decisions or dally over his meal. If he tackles a morsel that is too large to go down easily at the first gulp, he calls on his eyes to help him. His bulging eyes are drawn in and pushed far down toward his throat. The muscles behind them help push his food down into his gullet. If he catches an over-size earthworm or a salamander he pushes it down a little at a time. Sometimes he uses poor judgment and tackles something too big for even his double-action hatch. He may strangle himself, and pass away in the middle of his meal, which to a toad is perhaps the preferred way to die. Scientists with the Cincinnati Museum of Natural History once found a toad that had strangled to death on a large spotted salamander that could only be gotten half way down. Fortunately, however, this is rare, and most toads are sensibly content to take their food in small portions and with greater frequency.

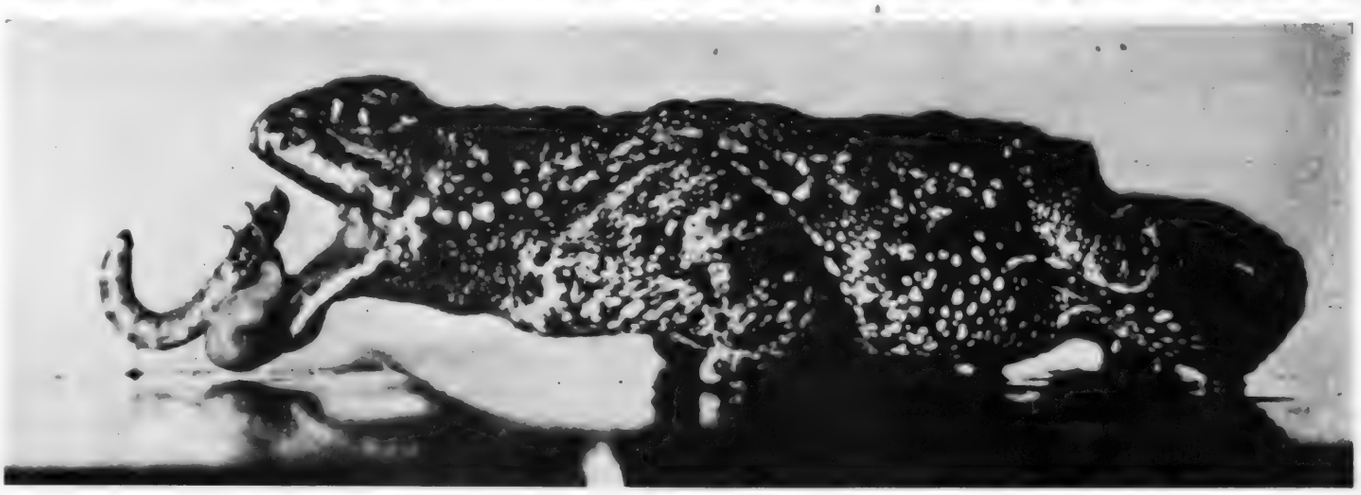
Sugar beet growers of Puerto Rico have recently called on the toad to help them with a pest problem. When Puerto Rico's sugar industry began to grow so did its population of white grubs. For a few years it was touch-and-go between the planters and the grubs, but the government biologists had an idea. There was, in the tropics of South America, a giant toad with a stomach capacity much greater than the ordinary hop toad. Armies of the giant toads were released on the sugar plantations and in a few years reduced the white grub to a nuisance rather than a menace. Now the giant is being introduced into sugar beet areas of the continental United States for the same job he did in Puerto Rico.

IN SPRING the toad becomes a musician. He fills up on air and as it escapes he makes sweet music for his favorite female.

Look Out Toad

The toad, though camouflaged by nature, and minding his own business, is not immune to danger. He has a long list of enemies. Ducks and chickens like toads,

THE CAMERA CAUGHT what the eye misses. A toad's tongue works too fast for the human eye to see it. An English photographer solved the problem by placing toad and bait on electrically charged copper plates. The camera clicked when the current was completed.



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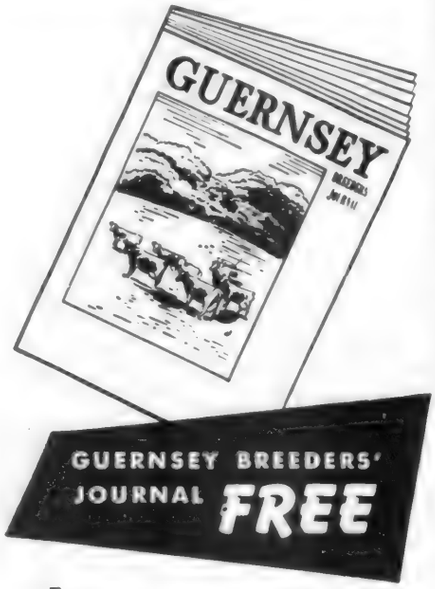

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especially young ones. Hawks and owls will eat them, any size. His worst enemies, however, are snakes. Garter snakes and hog-nosed snakes are especially fond of toad meat. The toad is not always helpless when confronted by a snake. Because of the way snakes are designed, they can most easily swallow streamlined food built like themselves; they have trouble eating a large round morsel. The toad knows about this and when he comes face to face with a hungry snake he may fill himself up with air and become tight as a Coney Island balloon. This discourages the ordinary snake. Sometimes a smart one will nip his hide and deflate him.

The toad's best weapons in his struggle for existence are his camouflaged hide and his ability to play dead. Predators that eat only living animals generally disregard prey that doesn't move. The hop toad plays this weakness for all it's worth. In the face of danger he gives an agile flip and lands on his back, lying motionless and scarcely breathing. When the danger is past he straightens one foot into the air, then the other, flips to his feet and goes immediately about his main business of eating.

If these deceptions fail to convince the skunk, hawk, or owl that the toad is dead, he has still another weapon. Hidden away beneath his wart-covered skin are glands filled with a bitter fluid. As a last resort the toad covers himself with this slightly poisonous and unappetizing liquid. Dogs don't know instinctively about this, but they soon learn. A puppy chancing across his first hop toad out in the flower garden will usually grab the toad with enthusiasm, but his enthusiasm is short-lived. Most dogs will pick up only one toad in a lifetime.

Skunks are especially fond of toads. They have learned how to process a toad to make it tasty. Before taking a bite, the skunk rolls the toad over and over in the dust until his last drop of ammunition is expended.

How The Toad Lives

After a summer of constant eating the toad is prepared to sleep through the winter. During the cold months he hibernates below the frost line. He is well equipped to dig in soft earth. The toes on his hind legs are padded with hard black callouses with which he moves the soil. He starts burrowing beneath an old log or a rock, or along a fence. He is soon out of sight and doesn't show up again until the first warm rain of spring awakens him.

When he crawls to the surface early in the spring, he wastes no time joining other toads at the nearest shallow pond, marsh or slow moving streams. For a few days his hunger is either absent or ignored; he has more important business. He is filled with the burning desire to get a new crop of toads started.

The females start laying their eggs single file in a transparent, gelatinous strand that strings out in the water and wraps around straw and twigs. The string of eggs may be several feet long and contain four to eight thousand eggs. The males fertilize the eggs as they are laid. Within a few days the egg laying chore is complete and the adults leave the water to take up their summer-long job of eating in the surrounding fields and gardens.

The masses of tiny eggs they leave behind begin to hatch in about four days. The pond becomes heavily populated with polywogs. The speck-sized tadpoles attach themselves to twigs and grass and feed on algae. As they gain a little size they include mosquito larvae in their diet.

In 40 to 60 days the tadpoles begin to trade their fins for legs, and their gills for lungs. When they have changed over to toads they leave the pond, usually on a moist night, and don't return until three or four years later when they are old enough to breed. If there is danger of the pond drying up tadpoles won't wait around for the sad day. Somehow they sense the impending disaster and become full-fledged hop toads while still quite small.

When the hatching is in full swing, swarms of tiny toads invade the fields, pastures and highways. Because they like to travel when it is damp, they are often noticed after a spring shower. This is the source of the old superstition that, when you see yellow colored clouds it will rain toads.

A toad grows faster than his skin, but this does not alarm him. When his coat gets too tight for comfort he removes it. The skin splits down the back and down the legs and comes off in one piece. It is no longer a spare suit, but something to eat, so he eats it. Toads may shed their skins several times each summer as long as they live. The frequency depends on the rate at which they grow, which, in turn, depends on the available food.

They work hardest at night. They patrol the bean and potato rows, cleaning off the insects. Their huge eyes enable them to see in dim light. At dawn they are content to stop for a rest. When the sun gets hot they seek out a shady, damp spot beneath a pumpkin leaf or behind an old log and sit there hunched up, waiting for the sun to go down again. If the weather is muggy they may venture out for more food. If an inexperienced beetle decides to share the shady spot, the toad knows no union rule that prohibits him from taking the free offering.

Toads live to a ripe old age if they don't meet a violent end. The oldest toad on record died at the age of 36, when he was killed by accident.

Toads are hardy creatures and can survive great ranges in temperatures. They have no constant blood temperature, but get their warmth from the sun. They are active when the weather is warm, and sluggish when it is cool. In a pinch they can go without food for several weeks. They have been found alive in the walls of dismantled stone buildings. The chances

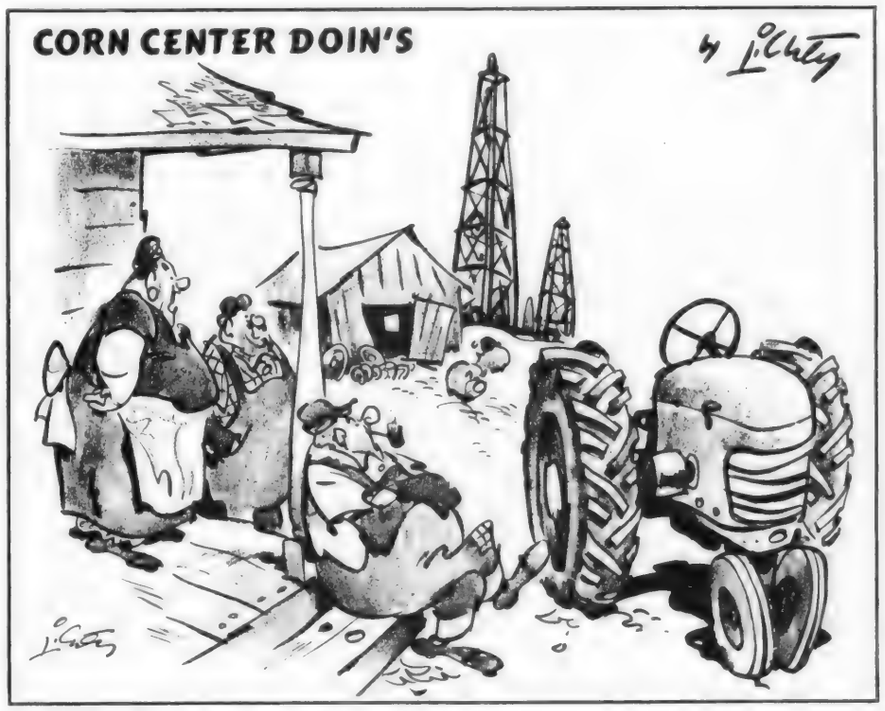
are that they burrowed into the wall between the stones the season before. Stories that toads have remained alive after years on entombment are without foundation. They can live no more than a few months without food and air.

A toad will sometimes dig himself into a hole he can't get out of. It is not unusual to find one in a well. He arrived there by a miscalculation when he burrowed between the stones from the outside. He may get a lift out in the old oaken bucket, or he may be drawn up by the pump and dumped into the water trough. If the well is an old one and nearly dry, the toad may settle down to live out a happy, secure life in his cool moist dungeon.

The toad, being a philosopher, doesn't seem to mind the false stories that have circulated about his occult or therapeutic powers. Contrary to the farm boy's belief, toads don't cause warts. Neither do they have the healing powers ascribed to them by the ancients. Martin Luther best known for more religious thoughts said in a table talk, "Experience has proved the toad to be endowed with valuable qualities. If you run a stick through three toads, and, after having dried them in the sun, apply them to any pestilent tumor, they draw out all the poison, and the malady will disappear." Toads were long thought to be poisonous, and in some regions are still believed to have this power. Their eyes were once thought to be charms that would ward off evil, and Lyly, a medieval English poet once said: "The fayrer the stone in the toad's head, the more pestilent the poyson in his bowelles."

Toads make good pets. They will often return day after day to the kitchen doorstep where they sit and collect flies that come around the screen door. One insect collecting scientist had a pet toad who was always willing to take the left overs. At night the scientist tacked up a white sheet against a tree and threw a light on it to attract night flying insects. He picked off the ones he wanted for his collection, and flicked the rest to the ground. Night after night the same hop toad returned, took up his station beneath the sheet and caught the bugs that were knocked down to him.

As you hoe your garden, look sharp lest you injure him. He is almost always near and will sit for hours watching you. He blinks his tired eyes, and without thinking or shifting his body, reaches out for a passing fly. He is likely content with life, for who on a hot summer day can say he is happier than a toad with a belly full of bugs, resting in the shade of a rhubarb leaf.



Lem says since he struck oil he's got time to sit 'n admire them B. F. Goodrich tires.

Farmers everywhere like B. F. Goodrich tractor tires because of the open tread—the flexible tread that keeps itself clean. The unconnected cleats bite deep, pull hard. The flexible tread pushes out mud, dirt and trash. The tread stays clean. Work gets done faster. You save on fuel. When you need tractor tires, see the BFG man. Get the tires that give you full traction, last longer and save time and money on every job.

An advertisement of The B. F. Goodrich Company, Akron, Ohio

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ONE WHEEL GARDEN TRACTOR

$135.00 1 H.P. Attachments Extra
$149.00 2 H.P.* with std. clutch —Plus Freight

*(with Centrifugal Clutch $10.00 Extra)

The CHOREMASTER lightens and speeds lawn and garden tasks . . . yet this rugged unit provides help for many farm chores, too! Plow corn after it gets up . . . cultivate high growing crops . . . plant rows closer and save space wasted by wide-turning tractors at end of rows. Its one wheel is unequalled for fast, safe cultivation of delicate crops. Add low-cost attachments as needed for cultivating, weed and grass cutting, lawn sweeping, hauling, snow plowing, spraying and other tasks. CHOREMASTER'S design puts former back-breaking jobs under fingertip control. See your dealer or write for folder showing the many jobs CHOREMASTER does.

THIS SIMPLE HITCH ($4.00) DOES THE TRICK!

Hitch your present hand mower to CHOREMASTER power. Costs no more than comparable single-purpose mowers.

SPECIAL PRODUCTS DIVISION
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HERE'S WHY:

IT'S A WEED CUTTING MOWER

Worthington Rotary Disc mower slices through weeds chest high and higher — cleans out growth along fence lines, ditches, roadways and windbreaks.

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Name _____
Address _____
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WORTHINGTON MOWER COMPANY
STROUDSBURG, PA.
Subsidiary of Jacobsen Manufacturing Co., Racine, Wis.

CAJUN FARMER

(Continued from page 28)

of Gold. The Louisiana sweet potato is not a sweet potato, but a yam. Its ancestors came from Puerto Rico.

Louisiana takes a sizable slice out of the sweet potato market of the United States. Near Opelousas, where Joe Stelly has his farm, is the village of Sunset, known as the sweet potato capital of the world. In this small village of 1,200 people there are 22 packing plants where the potatoes are washed, sorted, inspected and crated for shipping by truck and railroad to the Northern markets. Opelousas, a more sizable town with better accommodations for visitors, is the scene each October of a sweet potato festival known locally as the "Yambilee." Up north, in West Carroll Parish, there is another sweet potato area, perhaps with better soil and climate and less weevil.

The Sweet Potato—How It Grows

If there is a break in the weather in January, Joe Stelly and his neighbors like to start their plowing for potatoes. A tractor in the fields of St. Landry Parish is a novelty; the two-horse (or mule, or one of each) walking plow is the rule. A ridge 12 to 15 inches high is thrown up several days before planting in order that it be well settled for the plants. This is the seed bed for the sweet potato "slips."

The slips are sprouts which grow from the "eyes" of the seed potato, which is planted whole. As soon after the 20th of February as possible Joe Stelly starts making his "mother beds," using a plentiful supply of manure and fertilizer. He plants his seed in about six inches of good soil. Small growers, those with a part of an acre, make an old-fashioned hot bed, but Joe plants the seed potatoes end to end in rows. The potatoes have been selected the fall before and stored in a rat-proofed shed and given a liberal dose of DDT to keep the weevils away. If he buys seed it will cost him $3.50 a bushel, about twice what he can get for his marketable crop. He may space his seed planting out two weeks in order to have slips coming on during the planting season. As early as possible when the weather breaks, the slips are set out. In order to have an early crop, which brings the most money, the first of April is not too soon. The planting is a day to day job for several weeks, but Joe likes to finish it by the last week in May. If the weather is bad or there are other delays, the planting can be carried to the middle of June and still produce a crop.

The slips are pulled off the potato in the mother bed, bunched, and dunked in a bucket of water to keep them fresh and alive. Some planters use a sharp stick to make a hole in which the slip is dropped. Joe scorns this method which he regards as slow and effeminate. He uses his rugged index finger. If it is dry or if rain is not in prospect, a can of water, from a barrel pulled around on a sled, will be poured around each slip. The soil is packed around the roots, and the sweet potato plant is then in the hands of Mother Nature. The slips are 12 to 15 inches apart. It is better to work in the afternoon so that the plants will have the advantage of the cool night to get a start. There are 8,000 to 12,000 plants to the acre. Joe and his son and daughter have put out an acre of plants in one "evening." An "evening" to Southern folk is that time of day between noon and darkness.

The crop is cultivated several times during the season to keep down the weeds. This is done with a 10-shovel cultivator straddling the rows, or sometimes a disc plow-like tool known as a "middle buster," is run between the rows to ridge them up a trifle. Sometimes a single shovel plow is used for this purpose. If the weeds are too bad, the whole family turns out with hoes to work close to the plants.

The fortunate planter who gets his crop in early and can dig his first potatoes by late July skims the cream of the prices. The first of the crop is shipped "green," commanding premium prices in Northern markets. The sweet potato is a three to four-and-a-half months crop. During the last month as much as 25 bushels per acre will be added to the crop in increased size. A grower who harvests early may be kidding himself.

Before the potatoes are dug the vines are cut with vine cutters and the potatoes are plowed out. Two trips are made, one up and one down, in a row, or the row is "busted" with a wide shovel down the middle. The vines are turned under for green manure, or fed to cattle. Picking up the potatoes is a back breaking job and the picker must rake around in the dirt to find the covered potatoes. The most careful of pickers will miss some and after a heavy rain the field can be gleaned again for the uncovered potatoes.

By mid-September the Eastern and Northern markets are well supplied with green potatoes and the price falls off. The remainder of the crop is dug and taken to the kiln in "James" crates holding a bushel and stored until prices are more favorable. The trick is to catch the market at the peak. The packing sheds operate all winter, bringing in the potatoes from commercial storage or the kilns on the farms, washing, crating and sorting them. They are packed in James crates 50 pounds to the crate. The boxes are a considerable item in the cost but, unlike the Irish spud, sweet potatoes cannot be shipped in sacks or loose in a car, because spoilage results from bruises. The stored potatoes are better quality than the first green pack, for as they age and dry out the sugar content increases.

Last year Joe Stelly's crop was 150 bushels to the acre for the early green potatoes and 200 bushels per acre for the late. This is a good yield. Exceptional yields will go to 400 bushels per acre, but the average for Louisiana is about 85 bushels per acre. For the early crop he received $2.60 per bushel and for the late an average of $1.50. The total yield on his 10 acres was close to 1,750 bushels.

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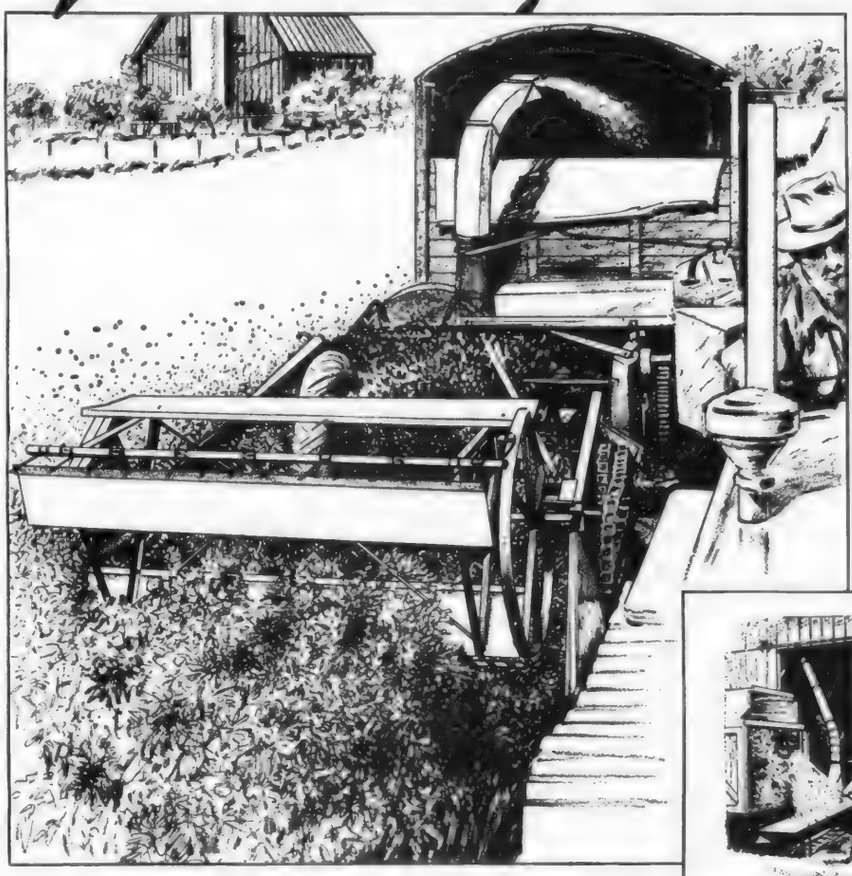

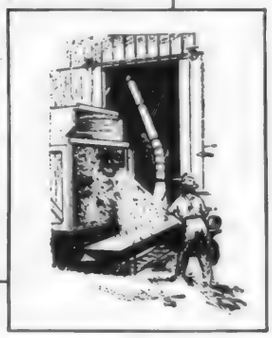

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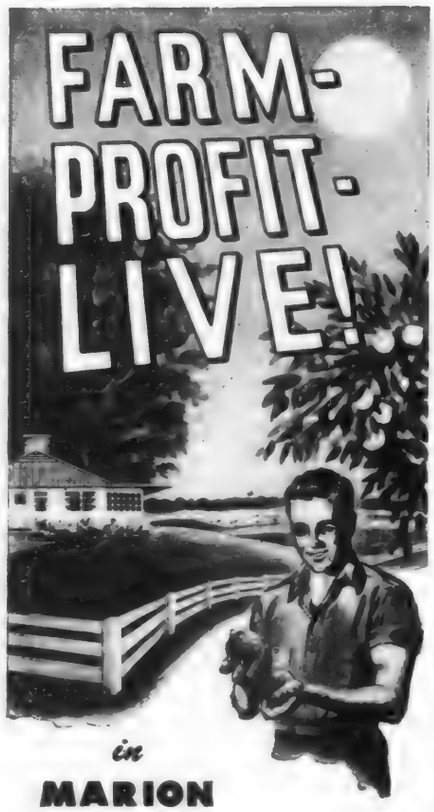

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Here among friendly people you can enjoy wonderful hunting and fishing. Silver Springs, Rainbow Springs and many other famous springs are located in Marion County. Come to Marion County, investigate the future it holds for you.

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Please send me information on profitable farm opportunities in Marion County.

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At all times the sweet potato must be handled carefully, almost like eggs. Cloth gloves are always worn by workers. A bruise might cause decay and if the yam is handled too much dry rot might result.

Pests and disease which attack the sweet potato are few and with the exception of the weevil are not difficult to conquer. If the soil is too sweet the potato is likely to contract a disease known as soil rot. Black rot is another type of disease which is eliminated by disinfecting the seed with bichloride of mercury or a similar compound. Soil rot and black rot are not important and with ordinary care losses can be kept to a minimum. The sweet potato weevil is a horse of another feather. He is the ruthless villain of the industry.

Close-up Of The Weevil

The corn borer and the boll weevil, compared to the sweet potato weevil, are sissies. He is on the rampage from year end to year end, and since he takes refuge within the comparatively impregnable skin of a potato in three of the four stages of his life cycle, the new insecticides make little headway against him.

A small insect that looks like a dressed-up, streamlined ant, his life cycle is four to six weeks, giving him an astronomical advantage in numbers. The adult is about one-fourth inch long, dark blue on the head, snout and back, and brick red on the waist and legs. The female lays her eggs in a puncture made in the skin of the potato. In about a week the eggs hatch and the larva, a legless grub three-eighths of an inch long, emerges. It is this larva that does the dirty work. It burrows into the potato, leaving its castings behind in the tunnel. After eating like a horse for two or three weeks it goes into the pupa or inactive stage in the potato for seven or eight days, emerges as a weevil, and the cycle starts over again. There will be six to eight generations each year. The adult feeds on the whole plant, leaves, vines and potato; the larva only on the potato.

The main control measure is the destruction of host plants between season. All old plantings are plowed under, along with the turn rows, and the seed beds and mother rows. Volunteer plants and old potatoes left in the fields are searched out and destroyed. If possible, potatoes are not planted in the same field as was used the previous year; both seed beds and field plantings should be at least 100 yards distant from plantings of the previous year. Seed potatoes should be dusted with DDT and stored away from the regular storage building. In many areas stock are allowed to range on the fields after harvest to eat any potatoes or plant parts remaining. This destroys the weevil population and its food, which might carry it over to the next season. Morning glories, of the same family as the yam, are favorite host plants for the weevil. Fortunately the weevil is a short-winged rascal and although he will travel up to two miles, he doesn't like it. He will crawl into cracks in buildings and all storage places should be thoroughly cleaned and fumigated.

The Department of Agriculture of Louisiana maintains an extensive control force which operates in all sweet potato areas. These men inspect every crate of potatoes packed, inspect the crops while in the field, and maintain a vigilant quarantine on heavily infested areas. A maximum of two per cent infestation is permitted, about one potato to a crate. If more, the shipment must be resorted and repacked.

The control of the weevil is gaining slow but steady headway. The sweet potato states would like to have an iron curtain around their potato areas, for continual sniping goes on from other states. Mississippi threatens to prevent the shipment of Louisiana potatoes across her borders; Louisiana hears of a new infestation in Mississippi, and while publicly expressing the greatest sympathy, chortles in private. At first glance this seems decidedly unneighborly, but in the end it keeps the control agencies on their toes and will eventually relegate the sweet potato weevil to the limbo where already many pests of the past are being forgotten.

Dried Sweets As Stock Food

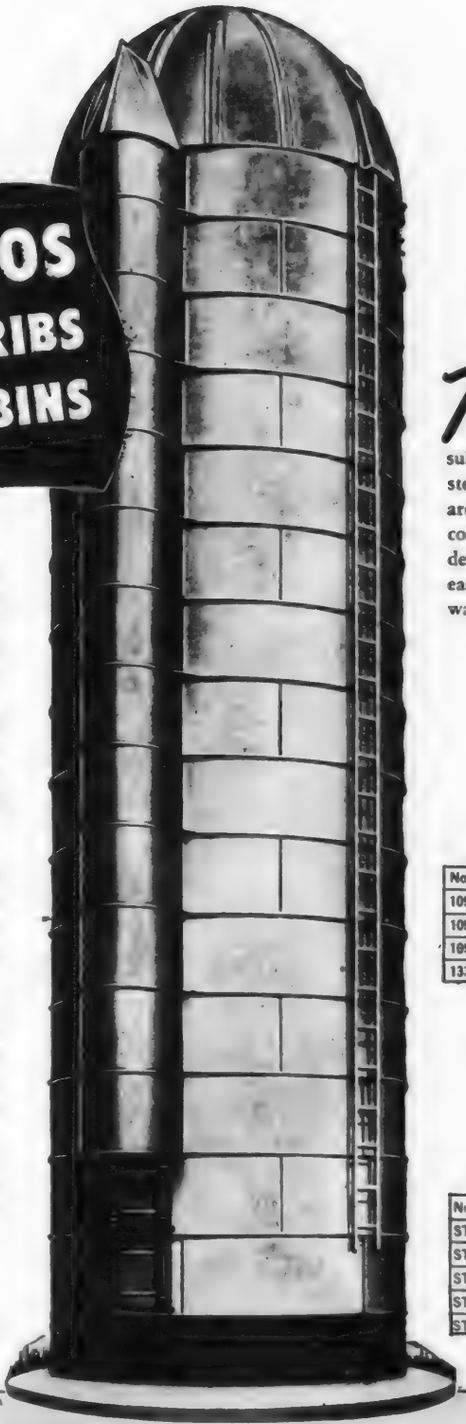
When a Louisiana farmer digs his sweet potatoes he throws out all those infested with weevil. The tell-tale scars made by the burrowing larva are easily identified. He takes these cull potatoes to a dehydrating plant where they are shredded and dried under heat. The careful potato grower hustles his infected potatoes to the drying plant as soon as possible in order to curb the spread of the weevil. Joe Stelly cleans his farm of sweet potatoes (except his seed potatoes, which he treats with DDT) between seasons, buying his eating supply at the grocery.

Dried sweet potatoes are relished by all kind of livestock, including poultry. They make a very acceptable breakfast food and a pocketful provides a tasty between-meals snack. They may soon be on the market, dressed up in a cellophane package with a fancy name, thanks to Dr. Miller and his assistants. High in carbohydrates, they make a good stock food when supplemented with cotton seed or soybean meal to provide protein.

The Share Cropper

Two years ago when Joe Stelly's son went away to business school and his daughter entered high school, he was faced with a labor problem. Unable to work his entire farm alone, he followed the common custom in Louisiana of hiring a share cropper. Joe's farm is small; the tenant is somewhat like a littler flea on a little flea. He built a two room shack back of his barn and pig pen and brought in a family of negroes. Of his 75 acres, Joe now has 10 acres in sweet potatoes, five acres in cotton, nine acres in corn and seven acres in pasture. He has several acres of fallow land. The negro farmer share crops the remaining thirty-five acres. Joe furnishes tools, seed and fertilizer. The tenant re-

STEEL *for* SILOS CORN CRIBS GRAIN BINS



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GREATEST DOLLAR VALUE — price for price, size for size, feature for feature, you get *lowest cost per year* protection for both your silage *and* your investment, with the *all steel* Silver Shield Silo!

Write today for complete descriptive literature on Silos, Corn Cribs, Grain Bins — Favorites for over 30 years.

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Rat-proof, weather-proof, substantial Buckeye galvanized steel Corn Cribs and Grain Bins are unexcelled preservers of corn and small grains. Correctly designed and precision-made for easy assembly, they "pay their way" in years of perfect service.

Buckeye Corn Crib

No.	Shelled	Ear	Diam.	Ht.
109	765 bu.	410 bu.	10'9½"	10'5½"
109-5	955 bu.	512 bu.	10'9½"	12'11"
109-6	1145 bu.	615 bu.	10'9½"	15'4½"
133	1160 bu.	625 bu.	13'3½"	10'5½"

Silo Type Grain Bins

No.	Small Grain Cap.	Diam.	Ht.
ST 7	700 bu.	9'6½"	12'6"
ST 10	1000 bu.	11'5½"	12'6"
ST 15	1500 bu.	13'4½"	12'6"
ST 20	2000 bu.	13'4½"	17'6"
ST 30	3000 bu.	15'3½"	20'0"

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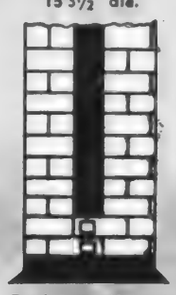

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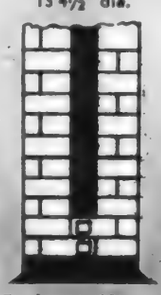
Feeds up to 42 cows.



up to 45' 13'4½" dia.
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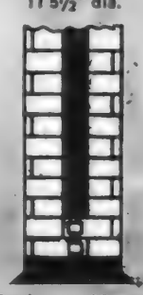

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Small dairy herds, goats and poultry.

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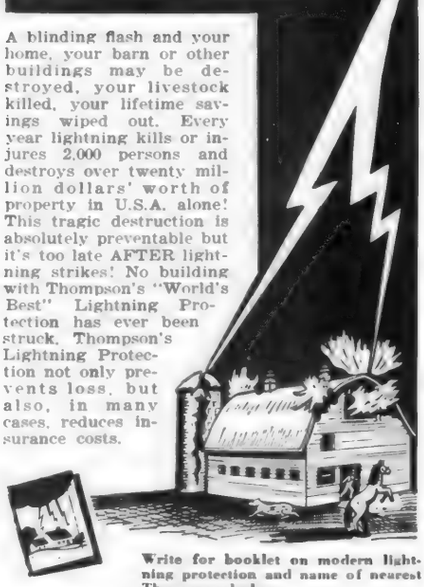

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ceives one-third of the crop for his labor, and may make himself up to $100 a month if he is a good manager.

Last year Joe Stelly's five acres of cotton made a bale per acre. He got 32 cents a pound for a 500 pound bale. His nine acres of corn brought him 110 "barrels" (total) which is about average for this area. Corn is picked with the husks on in Louisiana and measured in barrels. A barrel is roughly equivalent to a bushel.

The use of hybrid corn, after a late start, is gaining popularity in this part of Louisiana and south to the Gulf. Some farmers are skeptical when they are told they may increase their yield 20 per cent with the hybrids, and stick to old yellow dent because their fathers liked it. The farmer who raises 80 bushels of yellow dent corn to the acre makes the front pages in St. Landry Parish, and Joe regards his 12 bushels to the acre crop as fair. The soybeans he plants in the corn go under for green manure. His pastures are in Dutch white clover, carpet, or Dallas grasses. They are not the best, but better than most in his neighborhood.

If some farmers in this part of Louisiana seem to be slow to take up hybrid corn, they are not backward in the use of fertilizer. Joe uses 350 pounds of 4-12-4 to the acre for his sweet potatoes and 300 pounds per acre for his cotton. He uses some straight nitrate on his corn if he can get it.

Joe Stelly's little farm in the Teche country is by no means typical. The state does not have a large population of small farmers, such as one finds in Iowa, Indiana, Missouri and other Midwest states. The major crops, cane and rice, require large investments in land, machinery, and labor and for this reason the small farmer tends to be crowded out, for he cannot produce these crops by hand labor and compete with mechanized plantations. Cane and rice plantations tend to increase in size and are most economically worked in large units. While cotton is a good small farm crop, the new cotton picker has given the larger grower who can afford this expensive machine in Delta and river valley areas an edge in profits. The rural population, other than the owners of the large plantations, and their tenants, are mostly engaged in part-time farming or subsistence farming. The rapid industrialization of the state has been the salvation of the small farmer. He can hold down a good job in the city and, with the help of his family, can grow his own food with some to spare. Good roads permit long-distance commuting. Many workers at the Standard Oil plant in Baton Rouge live as far out as 50 miles.

One of the most thickly settled farm areas of the nation is along the Bayou La Fourche, where for more than 100 miles there is a continuous "truck" garden, small acreages with a few hogs and cattle and a little cane for home use.

THE COMBINE PARADE (Continued from page 45)

A year before Moore's machine arrived in California, young Ed Patterson, a strapping, up-state New Yorker who landed in California in 1852, took a fling at combine building. He induced John Horner to back him in building a "traveling thresher" combining the Hall threshing machine idea with the reaper. Patterson turned out a gargantuan affair which required 11 teams of big Missouri mules to move it. It had two "ground" or drive wheels 12 feet in diameter. It was destined to a short and inglorious career. A great crowd had gathered to watch its debut. It was pulled into Horner's field, the 22 mules tractably flapping their ears. As it was thrown into gear with a great rattle and roar, the mules bolted and the combine came apart piece by piece in the ensuing runaway. The scattered parts were not again combined.

However, Horner, bounced back financially and from 1853 to 1879, when he immigrated to Hawaii, he was a big factor in the development of the combine in California. He built at least three machines himself, all previous to 1866, and used them until he went to Hawaii.

While Horner was having his trials and tribulations, Strong & Taylor's combine entered the arena. Horner, who played no favorites, hired it to thresh some of his wheat. It was a small job and required only 10 horses; priced at $2000, it cut 25 acres per day of 40-bushel wheat.

Horner's machines were push jobs. Horner pioneered this idea, which was taken up by many of the early makers. It eliminated a good many of the hazards of handling mules in large masses. For one thing, a bumble-bee's nest would be pretty well demoralized by the time the combine rolled over it. This was also true of a rattlesnake, which the mules liked still less. Not having the horizon to head for when they took a notion to bolt, the 10 to 16-team outfits were more manageable. The driver sat at the top of a ladder. When the machine began to yaw and sway on a turn, and a bumble-bee's nest or rattler happened along at the same time, there were elements of raw action seldom equalled in a region in which raw action was commonplace.

Horner not only harvested his own crops but did custom work for neighbors. As acreage increased, the hand labor to work the harvest became scarce, for everybody was digging for gold. Until the combine came along, California wheat had been harvested with primitive tools by Mexicans and Indians. These laborers did not bow meekly to the tyranny of the machine age. Odd chunks of scrap iron found their

"DOC" WEBB'S Smart idea!

He uses girls, circuses, spectacular promotions; bargains, to gross $15,000,000 in a drugstore!

BEAUTIFUL GIRLS like Miss Janet Crockett, one of "Doc" Webb's nationally publicized "Florida Poster Girls," help stimulate drugstore sales volume.

"THE WORLD'S MOST UNUSUAL DRUGSTORE" sprawls over three city blocks in St. Petersburg, Florida. Guiding genius is Ford Truck user, J. E. "Doc" Webb. He built a hole-in-the-wall pharmacy into a $15,000,000 corporation in 23 years. Uninhibited promotion stunts have brought country-wide fame. Milking rattlesnakes ... treasure-hunt sales with ladies' panties selling at the cigar counter and bed sheets at the soda fountain . . . one-dollar bills going for 95¢, subsequently re-purchased at $1.35, are typical Webb promotions. Circuses and vaudeville are standard fare. This exploitation is backed by a smooth-working selling operation and a fleet of trucks, five of which are Fords.

"DOC" WEBB POSES in front of what was only a cut-rate pharmacy 23 years ago. Here "Doc" pulls such attention-getting sales-stimulating gags as displaying a scarf of Lincoln, worn when he was shot in Ford's Theater.

"DOC" WEBB'S Smart move!

He uses five Ford Bonus Built Trucks to do hauling in his business. Smart Move! Smart Business!

"I LIKE FOR MY TRUCKS and my promotion stunts to be slightly on the colossal side," "Doc" Webb tells Ford Dealer, Bill Grant, Jr., "that's why I got myself a new 145-horsepower Big Job." Replies Dealer Grant, "That was a smart move, 'Doc'! And you can bet that your new Ford Big Job will stand up and deliver. It's Bonus Built . . . built stronger to last longer, same as the 139-plus other models in the Ford Truck line."

"THE 145-HORSEPOWER V-8 ENGINE is a powerhouse on wheels," Dealer Bill Grant, Jr., tells "Doc" Webb. "It's got lots of important features like concentric dual-throat carburetor, hard, alloy-faced exhaust valves, etc.

"YOU SAVE 20% of your engine revolutions in overdrive with this 5-speed transmission. Fewer revolutions improve gasoline economy, prolong engine life. This transmission is standard in the Ford F-7 Big Job; it costs you nothing extra."

"DOC" WEBB'S . . . . . Smart bet!

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Look for this name
It's a sure guide to FULL VALUE in:

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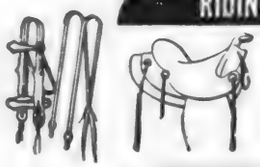

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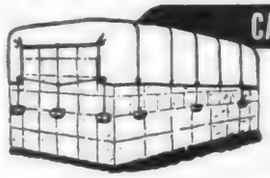

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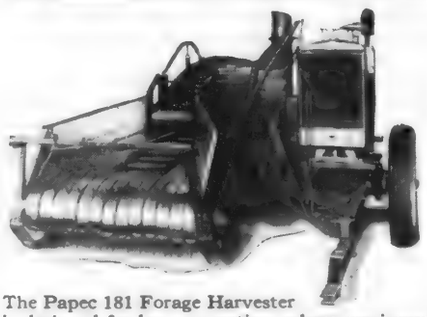
Leading harness, hardware and implement dealers feature BOYT items. For free farm catalog or new riding equipment catalog, write The Boyt Company, Box 1355-L, Des Moines, Iowa.

BOYT CRAFTSMEN IN LEATHER AND CANVAS WHERE STRENGTH IS REQUIRED

For MAXIMUM CAPACITY
THE PAPEC
181 FORAGE HARVESTER



The Papec 181 Forage Harvester is designed for large operations where maximum capacity is required. It has both hay and row crop attachments. The big 18½" throat handles hay crops—green, wilted or cured—sorgo, corn and other forage crops FAST.

Change-over from hay to row crop attachment is made quickly and easily by 2 men. Users report storing 15 to 18 tons of grass silage per hour from windrow with a Papec 181 and 3 men. The Papec does all the heavy work.

See your Papec dealer, or write for catalog describing both the No. 181 and the No. 151D Forage Harvesters.

Papec Machine Co., Shortsville, N. Y.

PAPEC

FORAGE HARVESTERS • CROP BLOWERS
HAY CHOPPER-SILO FILLERS
HAY HARVESTERS • ENSILAGE CUTTERS
HAMMER MILLS • FEED MIXERS

way into the wheat fields and from thence into the combine. In 1864 the California Farmer recorded the burning of one of the machines and the posting of a $500 reward by Horner for the apprehension of the culprit or culprits. The irate editor of the California Farmer backed up Horner's ad with a hot editorial berating the ignorance of the harvest hands in attempting to stop the wheels of progress.

The sabotage of the harvest hands was in vain. A rash of combines broke out all over the West Coast. It seemed that every wheat grower, machinist or combine hand who saw or helped operate a combine set to work to build himself a machine. This period from 1854 to 1880 was a quarter century of farmer-built combine development that slowly spread from the fundamental need of cutting costs in men, horses and the hazards of nature—north winds that whipped the over-ripe grain out for a loss of two to eight bushels per acre, wild geese that descended on the fields in sky-darkening clouds, droughts, fires, sabotage, and the competition of foreign wheat in world markets.

The Oregon Combines

While the combine was cutting its eye teeth in California, a parallel development was going on in the Oregon wheat fields. The Davis brothers built their first combine in 1862 and at the Oregon fair in 1867 their exhibit took the crowds away from the bearded lady. The Davis machine was operated by 10 horses and three men and could turn out 1500 bushels a day. It was a push-pull job with six horses behind and four ahead. The Davis machine was the first scale-down from the ponderous California machine styled in Michigan. As the brothers were preparing to manufacture their machines in quantity at the Oregon Iron Works in Portland, a fire destroyed their models and materials to put them out of business. They sold their patents to a California company and these key patents eventually passed into the hands of L. U. Shippee for his newly organized Stockton Combined Harvester and Agricultural Works. This company was destined to revolutionize the manufacture of combines. With its organization in 1883 combine making became big business and passed out of the hands of the lone wolf builders. Shippee also bought the patents of William Parrish's "King" combine, a Portland, Oregon job that had some success in Oregon and California.

The Shippee Combine

L. U. Shippee of Stockton, California, had "Western Vision" of what agriculture and California needed. A banker and purebred livestock farmer, he wanted to get the combine into production so that the average California grain grower could buy and use it to cut his costs and hazards. Shippee gathered up all the key combine patents he could get and in 1885 began turning out several types of combines—among them the Shippee, the Powell, the Minges, and the Grattan—all named for individual combine makers who had something a little different from the others. Prices ranged from $1800 to $2000, less than the prices asked today for small machines. They threshed 25 to 35 acres per day.

Shippee began to standardize machines and parts. Up to this time every maker had his own idea of how to put together a header, thresher, and cleaner. Some indeed were quaint and all were cumbersome, heavy, and cranky. The width of the swath was a keen point of competition. As this extended farther and farther it became weaker and weaker and parts of it were always dropping off or breaking. A broken part resulted in a long delay while it was being fabricated in the ranch shop or by the local blacksmith. No two were alike, even when made by the same man, and when a shop built one for a farmer it had to send out a crew to break in the buyer and his men.

If Shippee knew the time was ripe for big production of combines, others knew it too. In 1886, a year after the Shippee combine was put on the market, ten makes competed for prizes in one California county, San Joaquin. They were: Young, Reynolds & Patterson, Matteson & Williamson, Houser, Powell, Marsters, Shippee, Meyers, Minges, and Judson. Judson's machine deserves special mention. It was a combination horse and steam power outfit. Ten horses, five men and a 12 h.p. steam engine burning crude petroleum furnished the power and labor. The steam powered the cutting, threshing, cleaning and bagging mechanisms. The ten horses had the big job of pulling it through the field. This use of oil for fuel was undoubtedly the first on a combine.

The use of a steam engine to do part of the work on a combine was as old as 1871, when B. F. Cook of Napa, California, threw a Haines header, a Pitts thresher, and a portable steam engine together into an enormous monster. Like the Judson machine, the horses had the simple job of pulling.

The pioneering Shippee Company burned out in 1889 and its assets were purchased by Holt.

The Steam Jobs

In addition to the 10 manufacturers represented in 1886 in the contest in San Joaquin County, others were operating up and down the West Coast. Daniel Best and George S. Berry were operating steam powered outfits the same year. Berry is credited with making the first self-propelled combine. He was a rancher with a pronounced bent for mechanics. His steam tractor burned straw, the first of its kind. The straw fell from the combine to a platform behind the engine and two men pitched it into the firebox. Best had built a combine in Oregon in 1883 and in 1886 had 15 in operation in California.

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Easily handled, adaptable, sturdy, the Massey-Harris Pony is the ideal power for the truck or general farm of 50 acres or less . . . to handle the lighter jobs at lower cost and greater profit on the large farm.

As tractors go, it's a small tractor . . . but for its size, it has all the ruggedness, economy and performance features of larger Massey-Harris Tractors, even to electric starting.

With its dependable 62 cubic inch engine, it romps along easily with a 12″ or 14″ plow at 2¾ or 3¾ m.p.h. A high speed of 7 m.p.h. makes quick work of hauling to and from fields or along the highway.

All controls are at your fingertips. Clear vision makes cultivating easy. Light handling speeds up mowing. Band-type brakes on final drive, individually operated, "turns you on a dime" at row ends . . . in fence corners.

Matching the Pony is a complete line of quickly mounted tools—plows; field, row-crop, and vegetable cultivators; disc; mower—all designed to do good work, built for long life.

Look over the Massey-Harris Pony at your Massey-Harris dealer's. Get up on one and drive it. For details by mail, write to The Massey-Harris Company, Quality Avenue, Racine, Wisconsin. Dept. G-222.

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Which is really Joan Fontaine?

CO-STARRING IN
"You Gotta Stay Happy"
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(See answer below)

Spark plugs also look alike, but

AUTO-LITE

TRANSPORT SPARK PLUGS

are ignition engineered for farm use

IT IS hard to tell which is the real Joan Fontaine in these photographs. It's difficult, also, to select the best spark plug from outside appearance. But the new Auto-Lite Transport Spark Plug is built especially for the toughest kind of truck and tractor operation.

If you picked the girl at the left as the real Joan Fontaine, star of Universal-International's "You Gotta Stay Happy", score yourself 100%. Her "Look-Alike" at the right is Pamela Randell of Westchester County, New York. Score another 100% when you switch to the new Auto-Lite Transport Spark Plug, the plug that gives you the heaviest electrodes on any commercial spark plug.

THE ELECTRIC AUTO-LITE COMPANY
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Auto-Lite Spark Plugs—Patented U.S.A.

TUNE IN "SUSPENSE!"...CBS RADIO NETWORK THURSDAYS...CBS TELEVISION TUESDAYS

Best was an Oregon pattern maker whose interest in combines stemmed from a job which he helped build in 1883. He went to California and organized the Best Agricultural Works, where he built combines. In 1888 he started building steam tractors to power them. The Best steam job was a success from the start.

When steam finally took over to send 10 to 40 horse and mule teams to the glue factory or retirement, two men emerged as leaders in the steam tractor field. They were Best and Holt.

The Holt shop was at Stockton, California. Holt and its subsidiaries built 14,000 big machines in the 44-year period from 1886 to 1929. In 1925 Holt and Best merged to form the Caterpillar Tractor Company. Holt's and Best's combine business eventually passed to Deere & Company. However, Deere & Company were building 10, 12 and 16 ft. combines eight years before acquiring Caterpillar. Deere & Company inherited the know-how from the West's big machines and applied it to Midwest requirements when the "Baby" and the "Midget" combines began to appear on the small fields of the Midwest. Caterpillar now makes tractors, diesel engines and road building machinery.

The Holt Company made the first side-hill combine in 1891. In 1904 the company added auxiliary gasoline engines to their combines and in 1911 made the first self-propelled, gasoline-powered machine.

Besides Holt and Best, smaller manufacturers were turning out successful machines in lesser numbers. Among them were Northwest, Houser-Haines, Heald, Price, and a job made by the Benicia Agricultural Works.

The Roaring Frontier

The Holt and Best machines ushered in an era of wheat land expansion on the West Coast. The big machines, with the ragtag and bobtail crews which operated them, roared through the eighties and nineties.

The California wheat ranching frontier was as colorful and dramatic as the gold rush, the pony express or the covered wagon. Dr. Hugh Glenn, who farmed a block of 66,000 acres along the west side of the Sacramento Valley in what is now Glenn County (named for Dr. Glenn in 1892) annually gathered horses and men for his wheat harvest. He and his renters operated six of the biggest threshing machines ever built. They were powered by steam engines and were built to demands to annually set up world's records for a day's threshing. It took 600 men and 800 horses and mules to produce Dr. Glenn's million-bushel wheat crop of 1880. The harvest hands were a mixture of everything in human form that had come out to California—gold hunters, sailors from San Francisco harbor, train robbers, army deserters, gamblers, adventurers and fugitives from shotgun weddings back East. But they were the finest horsemen in the world and could ride or drive anything, handling six-horse headers and plows with one hand as they guided the header with the other hand on the tiller. On Saturday night they went to town to play just as the loggers and miners did when their play times came. Willows, 10 miles to the west of the ranch, was their goal. Willows' main street was lined with 18 saloons on one side and 75 women on the other. An extra boatload of women came up from Sacramento and parked in the river opposite the ranch for the peak load of the harvest season. The poker and black jack games in the bunk houses are still the talk of the Willows-Colusa areas. At least two murders took place, one over a hand of poker. The killer was scheduled for the rope but was reprieved as he listened to the carpenters finishing up the gallows at the Colusa jail. Wild geese raided the ripening grain in those days and control was a big problem. Glenn's wild goose herding bill ran $30,000 a year, the men riding horses in two shifts from the time the wild geese arrived on September 18 till the harvest was done. His twine and sack bill was $26,000 one year.

The labor and crop saving advantages of the combine were too important to be confined to the Pacific Coast. While the combine was born in the Midwest, it grew up on the Coast. Midwest farmers were cool toward the idea, claiming that wheat

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You can make *your* farm continue to pay as much as it did last year—yes, even more. Fields with poor crops can be corrected to produce high yields. You'll have bigger and better crops—and keep on getting steady increases in production for years to come, while actually building up your land instead of draining its vitality.

Save Time, Effort, Money

Soil tests save much time, effort and money often wasted using wrong kinds and amounts of fertilizers. You'll get the right answers from the soil itself—just how much nitrogen, phosphate and potash every field requires—whether lime is needed and how much.

Fertile Pastures Mean More Profit on Livestock

It costs the farmer with yield of 3½ tons of hay per acre only ⅓ as much to produce a quart of milk as it does the farmer getting one ton of hay per acre. Efficiency and good feeding programs can lower production costs but the final reckoning is based on the productivity of the soil. It is sound practice to always test the soil before applying fertilizer.

Both experiment station tests and actual farm experience show it is profitable to test and fertilize meadows and pastures. Herds grow faster, heavier and healthier when grazing on tested, fertile soil. Poor soil can also cause poor breeding.

Failure to Test Soil Costs Illinois Farmers $5,000,000

In 1947, farmers in Illinois who neglected to test their soil before applying fertilizers lost $5,000,000 additional income that could have been theirs, according to state agricultural authorities. 60% of the farmers still guess as to the kinds and amounts of fertilizer their land needs: over 100,000 tons of limestone were put on land that didn't need it.

One farmer saved $500 by using 125 tons of limestone instead of the 360 he guessed his soil needed—enough saved to buy all the phosphate that tests showed he needed on 65 acres.

Get Back $3.00 or More from Every Fertilizer Dollar

Test your soil and you can get back up to $3 or more from every dollar spent for fertilizers. Recent trials on seven fields proved that every $14.42 spent on potash and phosphate paid off $43 in extra crop yield. In Tennessee, cost of producing wheat dropped from 69c to 32c a bu. when fertilizer needs were determined by soil tests. In Maine, testing and fertilizing pastures increased milk production of a herd $370 per year, at a cost of $74 for fertilizer.

You may be wasting fertilizer where it's not needed — or not using half enough. Don't guess! Too much can harm growth just as too little can leave your land wasted and worn out.

Your Soil Is Your Most Valuable Asset

Soil tests are more important than all your implements, buildings, stock—get maximum yields and at the same time increase the value of your property. You'll use your Sudbury Kit right away and keep on testing your soil year after year.

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Simplicity and Reliability are the keynotes of this leading Soil Test Kit—even your first tests will be accurate and dependable. Exactly the same kit we furnish county agents, gov't. departments, agricultural colleges, and progressive farmers everywhere. Tests for nitrogen, phosphate, potash and acidity (pH). Complete directions include charts showing needs of 125 farm crops, fruits, trees, flowers, etc. Polished hardwood chest will last a lifetime. Money-back guarantee. In just one season, you'll save much more than its entire cost! Order right away at..... **$22.50**

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1. This ear grown on tested, fertile soil
2. Ear from soil lacking nitrogen
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NEW! Just announced. Sturdy, streamline welded steel chest Sudbury Soil Test Kit with luggage-type handle—more compact, easy-to-carry, for only $27.50. A real lifetime kit.

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is not ready to thresh when it is ready to cut. Another reason why the combine went into hibernation in the Midwest was its cost. Small farmers didn't have the acreage to warrant the investment in what was, in those days, an expensive implement.

About the time Moore was tinkering with his Michigan contraption, there was a rash of inventors throughout the country toying with the combine idea. Most of them got no further than the patent office. A few had short harvest field experiences and then rusted down into oblivion. The first patent was taken out by Samuel Lane of Maine in 1828. In 1835 D. Ashmore and J. Peck of Tennessee took out a patent on a header-stripper type patterned after the Gallic stripper of 17 centuries earlier. Briggs and Carpenter of Kentucky took out a patent a few weeks before Hiram Moore. Sometimes the makers sold "states rights" and their machines appeared under new names. Except these early efforts, which were sent to the scrap pile by the self-binder and the threshing ring, the combine pulled stakes and went West, from thence to return to the Midwest several decades later.

The Briggs and Carpenter machine deserves special notice. This machine operated near Rochester, N. Y., in 1839. Some 53 witnesses signed a statement appearing in the *Genessee Farmer,* October 5, 1839, that they had seen the Carpenter machine operate on the farm of Whiting Merry that season and recommended it to the favorable consideration of the farming community. The animal power used was two yoke of oxen and a team of horses. The rate of operation was two acres per hour and it was said that the loss of grain on the ground was less than lost by cradling. Farmers in the community agreed that its use cut harvest season and lessened weather hazards.

Two other machines, one made by Jeramiah Darling and the other by D. A. Church had brief roles in Illinois wheat fields in the mid-1840's. The *Prairie Farmer* says of Darling's combine: "Darling's Harvester cuts off the heads, threshes, cleans and puts in bags the clean wheat. We are not aware that any of them have been built in this section and can say nothing of its operation. The general impression is, among farmers, that wheat is not ready to thresh when it is ready to cut; and right or wrong, they are in the way of sticking to it for the present. The inventor of the implement spoken of assured us they would be obliged to give it up; and we agree with him that they *will* if his machine gets into use. The cost of this sort of harvester is an objection with the small farmer, but with the largest farmers perhaps would not be."

When farm machinery went on rubber the last obstacle to the general use of

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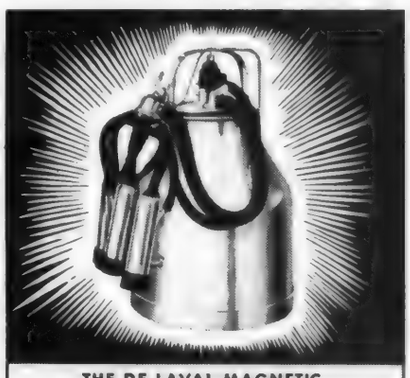

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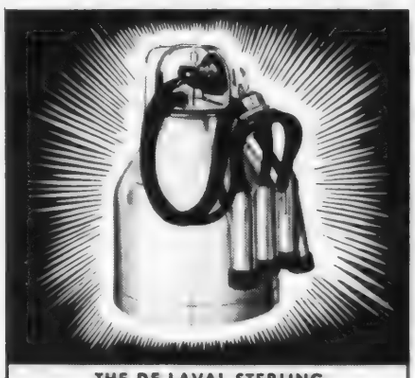

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The new De Laval Magnetic Speedway and new De Laval Sterling Speedway are now identical except for method of pulsation control. The new De Laval Sterling Speedette is especially designed for the herd of 10 cows or less!

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CHECK THESE EXCLUSIVE FEATURES

- **NEW "FULL-FLO" TEAT CUPS**
  One-piece liner; takes and stays in correct position on teat throughout entire milking
  ... CONTROLLED MILKING!
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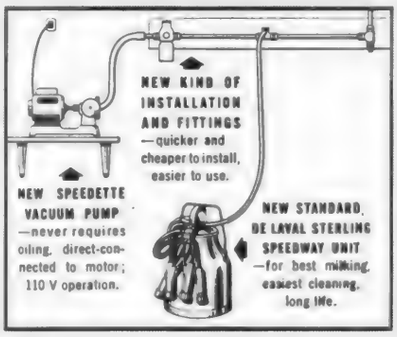
  Correct vacuum automatically maintained at all times
  ... CONTROLLED MILKING!
- **UNIFORM PULSATIONS**
  Magnetically controlled in Magnetic Speedway—cannot vary. Precise control by 2-moving-part pneumatic pulsator in Sterling Speedway
  ... CONTROLLED MILKING!
- **NEW "CONTROL-AIR" PULSATOR**
  Air metered through pulsator of new Magnetic Speedway provides new gentle pulsation action comfortable to cow
  ... CONTROLLED MILKING!

... AND MANY OTHERS SUCH AS THE NEW STAINLESS STEEL "SANI-CONTROL" PAIL WITH RUGGED DOUBLE BOTTOM.

THE NEW DE LAVAL STERLING SPEEDETTE


NEW KIND OF INSTALLATION AND FITTINGS —quicker and cheaper to install, easier to use.
NEW SPEEDETTE VACUUM PUMP —never requires oiling, direct-connected to motor; 110 V operation.
NEW STANDARD DE LAVAL STERLING SPEEDWAY UNIT —for best milking, easiest cleaning, long life.

Especially Designed for the Man Who Milks Ten Cows or Less!

The new De Laval Sterling Speedette is designed especially for the man milking 10 cows or less. Your pocketbook can afford it — and you can't afford to be without it! It will save up to 68 full working days a year on a 10-cow herd, save you countless steps, do the milking in half the time and produce more and cleaner milk for you. See it today!

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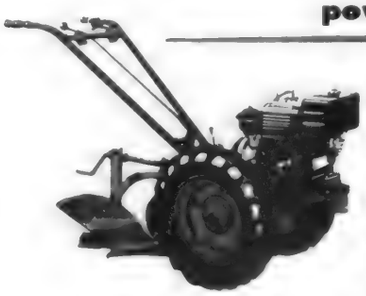
Yes! Simplicity Garden Tractors give you real value! Rugged construction — new features never before available on any garden tractor — year 'round versatility and easy, trouble-free operation . . for amazingly low cost. See Simplicity today . . . compare it feature for feature — dollar for dollar, and you'll see why the two great Simplicity tractors are big favorites with wise farm and home owners everywhere!

power for plowing



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Features a powerful new Briggs-Stratton Engine, 4-speed transmission, quickly and easily adjustable, heavy one-piece steel frame, drop-forged sealed gears, adjustable wheels, patented "quick-hitch" that mounts implements in seconds. Tractor easily pulls 8" plow and all other fine Simplicity implements. Tractor only,

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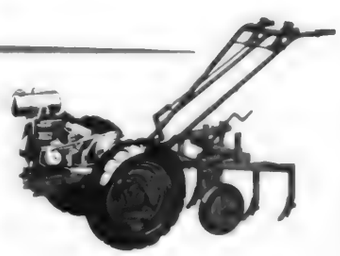
Highly versatile year 'round Model D features "quick-hitch", 4-speed transmission, drop-forged gears running in oil, adjustable wheels, easy, accurate performance—ideal for all smaller garden and home jobs. Tractor only,



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combines was surmounted. Rubber cut costs in power, for a one-size-smaller tractor can pull the same weight on rubber; rubber also took out the lurch and the jolt and reduced field failures and the strain on the machine from rough ground. Modern machines have more roller and ball bearings, steel has replaced wood, and V-belts have replaced chains; the gears are protected and there are safety devices everywhere. When rubber fails, as in the rice fields, tracks do the work.

The Babies And The Midgets

It was not until World War I took the harvest hands off the farm, and wheat became war material, that the combine came back to the Midwest. The machines that came out during and closely following World War I were copies of the big Western jobs, and were not economically a sound investment for the smaller farms except in a war emergency.

As the combine was being adapted to Midwest conditions, apparently by trial and error, some builders found that they could not scale down a big Western job and expect it to do the work in the hands of unskilled workers. The old line threshing machinery makers rushed into production as they saw that the old binder-thresher team was giving way to progress. The first attempts were not the answer to the Midwest farmers' prayers. Avery of Peoria rushed a combine out to the Kansas wheat fields in a year when heavy straw growth proved it didn't have a big enough engine on it to power the threshing, cleaning and elevating mechanisms. Then several of the old thresher firms venturing into combines found there was more to it than a hybrid thresher and header being pulled by horses. Some went off the deep end by building their machines too small for the header. These couldn't handle the straw fed to them. There is a saying by old California-Oregon combine men that no two seasons are alike; not even the same field the same year is all uniform. Midwest conditions are more complex than those in the big wheat ranches of Kansas, Nebraska, Colorado and Texas. A practical machine must be able to handle all parts of the field year after year—weedy, short, long, thin, heavy, uphill, down-hill, side-hill, muddy, sandy, rocky or peaty soils, and it must handle about every farm crop—grain, flax, beans, mustard, all the soil building seeds, etc. Allis Chalmers claims their combines will harvest a hundred crops or more.

In 1934 Minneapolis-Moline brought out the Harvester with a 12 foot cut, a machine which weighed nearly a ton less than previous combines of this size. It featured single unit construction and a self-leveling shoe. It is selling today in good volume and its popularity leads M-M to believe this size thresher will always be an active competitor of smaller machines.

It was not until 1935, when a number of implement makers, chiefly those who were already making tractors, began making the so-called "Baby Combine" for small farms. These were powered by gasoline tractors. Some were pulled by tractors and had self-contained or auxiliary gas engines for the cutting and threshing mechanism. Some cut a swath five or six feet wide; others, only 36 to 40 inches. These were the "Midgets".

The 1949 small combine has more or less jelled in the five and six foot class. Allis Chalmers made small five and six foot, pull type machines in 1935 and for several years produced more than all other makers of this type combined. Those builders who tried to bring the combine down to three feet found they had gone too far to be practical. They cost too much for the work they could do, and they were getting too small to do a good threshing job in spite of the idea of reaching a bigger market of smaller farmers. On the West Coast most of the small combines have auxiliary motors to keep them threshing on turns, stops and starts with less waste of time and grain. A small combine for the West Coast has an eight or nine foot cut; in Idaho and a few small farms in the foothills a six foot machine sells well. Outside of color—green, red, orange—all the small combines look pretty much alike. The little Massey-Harris Clipper, the John Deere and International small sizes, all appeared at about the same time and all look like bright beetles scuttling through the fields. The Allis-Chalmers has stuck pretty

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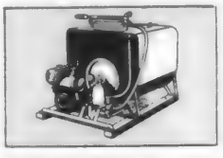

SKID MOUNTED—Haul it any way you want: truck or trailer, tractor or jeep.

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- Be sure . . . the boom is *non-corroding!* Hudson booms are all-brass, hose is oil and chemical-proof.
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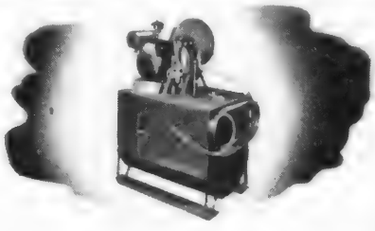
- Be sure . . . it has mechanical double agitation. Full strength solution at all times in Hudson Power Sprayers!



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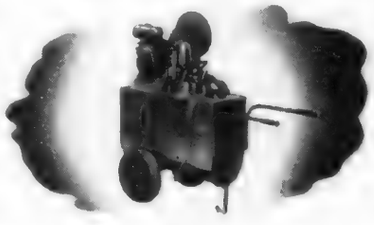

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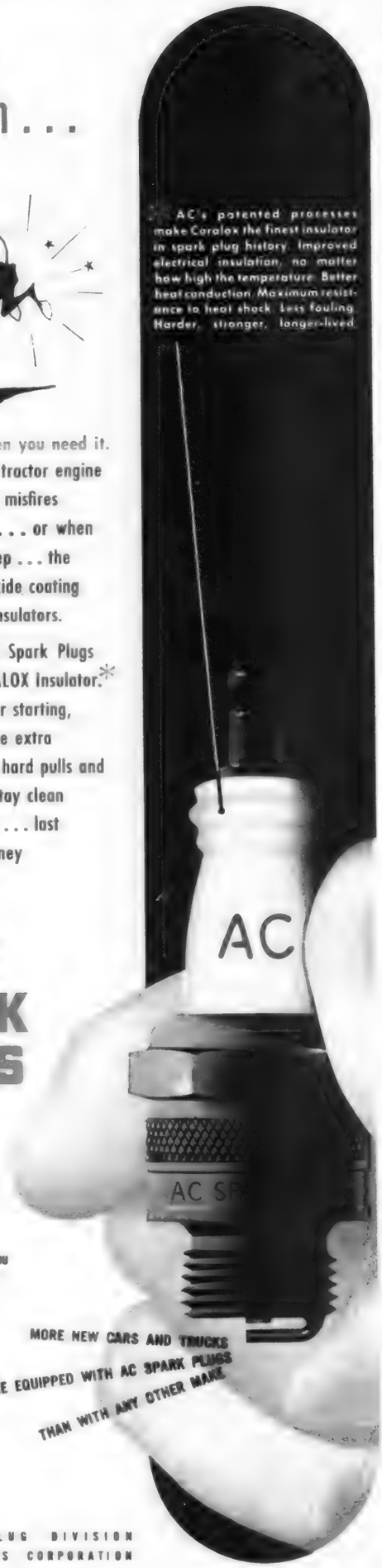

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GENERAL MOTORS CORPORATION

much to its design of the early 1930's that widened the field of combining by handling all the soil building seed crops. That firm followed up with many special attachments for different crops and conditions.

The Western trend is distinctly to the self-propelled types. Massey-Harris stimulated the modern self-propelled trend in 1948 when fleets of its machines, known as the "Harvest Brigade", rolled from the Mexican border to Canada in the greatest farm machinery demonstration yet seen in the United States. The trend also is toward smaller one-man machines—the behemoths of the old days are going. The small combines of 1948 are not only improved, but the owners have had more experience in operating them. The West has developed the best operators. Out there on the one-man, self-propelled combine, the driver gets $20 a day and is an expert mechanic. Some of the grief which accompanied the introduction of the combine elsewhere stemmed from inexperienced operators. This was true in the South when rice combines were going in. Gone are the bindlestiffs, hired out of the flop houses of San Francisco at $1.50 a day. The modern operator is a skilled worker.

The Combine Of The Future

The auger table instead of the canvas, which had a tendency to stretch, wear and break out, will come into more general use although it is 20 years old. Another is the all-crop pick-up reel, which seems to have an uncanny mechanical intelligence. Its tough wire fingers reach down and pick up lodged and tangled crops and feeds them into the sickle and header.

There has been a recent trend in the Midwest toward combining grain from the windrow. Its advocates say it saves grain and improves grain condition. Sales of windrowing machines have increased and combines are regularly equipped with windrow pick-up attachments. New machines will stress hydraulic or electric controls and ease of operation by one man at higher speeds. They will be streamlined and gaily painted for eye appeal.

Modern combines range from a 20-foot cut hillside machine made by Deere & Company, weighing 13,024 pounds, and costing $5,220.00, a Massey-Harris track type rice combine weighing 10,085 pounds, with a 14-foot cut and priced at $5,448.00, and a 21,000-pound giant with a 16-foot—8-inch cut built by Van Dyke priced at $23,500.00, to Case's and Allis-Chalmers' small 5-foot jobs priced under $1,000.00. Manufacturers in the field in 1949 are: Harris Manufacturing Co., Stockton, Calif., Hahn & Mehrten, Stockton, Calif., Van Dyke Machine & Welding Works, Del Paso Heights, Calif., J. I. Case Co., Racine, Wis., Deere & Co., Moline, Ill., Minneapolis-Moline Power Implement Co., Minneapolis, Minn., Massey-Harris Co., Racine, Wis., International Harvester Co., Chicago, Ill., Oliver Corp., Chicago, Ill., Allis-Chalmers Mfg. Co., Milwaukee, Wis., Dearborn Motors Corp., Wood Bros. Division, Des Moines, Iowa, Gleaner Harvester Co., Independence, Mo., and Cockshutt Plow Co., Canada.

If there is any doubt about the combine being a permanent institution on the American farm, go to the farm wife. She will tell you that the combine lightened her labors too, for she remembers those sweating armies of thresher hands that crowded around her dining room table in the old days. Those threshing dinners were the year-long nightmares of farm women. For weeks they planned ahead for threshing time, organizing their strength, dishes, food, relatives, and neighbor women to handle the thresher feeding crisis. All that has been swept away by the combine. Many a machine has been sold on that domestic issue. The farm women caught on to the economics of the combine faster than some of their men.

THE AUTHOR

F. HAL HIGGINS, Oakland, California, a transplanted Iowan, has had a long and distinguished career as a writer and editor on farm subjects. After graduation from Iowa State he spent a number of years on the staff of various breed and stock associations and then settled down as editor and writer, mostly on farm magazines and magazines connected with farm machinery manufacture. He has made a life-long hobby of collecting historical material on farm machinery and owns one of the finest collections of farm machinery literature and art in the country.

LETTERS

(Continued from Page 8)

SAFETY FOR HAWKS

Dear Sir:

Enjoyed your splendid article on hawks by Charles P. Fox, but you did not mention a device used right much in the South. Many farmers put up martin guards in which some kind of martins live. They claim that these birds will keep the hawks chased off.

E. P. Bass

Farmville, N. C.

Dear Mr. Bass:

My own personal opinion is that the martins would be completely helpless before the onslaught of any hawk. A number of times reports have come in that a colony of martins would gang up and attempt to chase away a small sparrow hawk, when it gets too near the martin house. Actually these martins are completely at the mercy of any hawk that might be looking for a meal.

It is very conceivable that colonies of martins have been seen ganging up and chasing some small hawk. Actually, they weren't chasing the hawk off; the martins were just becoming a nuisance to the hawk and he was only flying away from the aggravation.

Charles Philip Fox

HOW MUCH PROTEIN?

Dear Sir:

I have just received my copy of the Spring issue. I would like to point out a mistake in the article How To Feed Hogs. On page 88 Mr. Zeller gives the percent of protein that should be fed to hogs. He has listed Bred Sows at 15% in dry lot, 13% on pasture and Bred Gilts at 13% in dry lot, and 11% on pasture. These figures should be reversed. I feel that this is a printer's error but one which should be corrected.

John E. McCarthy

Dear Sir:

Mr. McCarthy is correct in pointing out the error. The manuscript submitted was the same as printed. This was a typographical error.

John H. Zeller

Beltsville, Md.

WE'RE FAIR TO CATS

Sir:

The article about cats in your last issue is the only one I've ever read that was completely objective.

I like cats and I like the *Farm Quarterly* and when I saw the title I was afraid the article would end another friendship; but I read it all the way through without an inclination to cancel my subscription. In fact, I didn't even get mad. May I congratulate you for an extremely interesting article and a fair evaluation.

Two statements aroused my curiosity. Do cats eat shrews or only kill them? And, does the male hunt more after castration and the female hunt less after spaying?

It has been just the reverse with our cats, but I realize that a few cases don't prove much.

A. L. France

Alexandria, Ky.

Shrews carry a scent sack that is thought to make them distasteful. Cats will kill shrews. The authority for the statement that spayed cats hunt less than unspayed females and that neuters hunt more than other males is the president of the American Cat Association. Ed.

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This TILLAGE COMBINE rolls, levels, harrows, stirs, pulverizes, cultivates, mulches, and gently packs in ONE OPERATION! Completely works, reworks, and triple works soil 6 to 7 inches deep. Equipped with the famous Dunham wedge-edge, one-piece wheels, and double spring teeth. Teeth may be raised and unit used as a straight Culti-Packer. Most effective tool obtainable for preparing all seed beds.

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It is the farm wagon with the built-in tractor-power operated HYDRAULIC HOIST for quick, safe, easy dumping. Large volume (150 bu. grain-tight box) and heavy load capacity (4½ tons maximum). Built big and sturdy to do your tough hauling jobs--and to out-perform any other farm wagon. The more hauling you have the more you save in time, hard work and cost of extra help. Five utility attachments for the same 7 ft. x 12 ft. platform--you buy only the ones you need.

150 Bushel Grain Tight Box

CHOPPER WAGON

STOCK RACK

STAKE RACK

MORE HAULING COST-SAVERS

HI-SPEED WAGON - Model 21-A Similar construction and convertibility to Model 31-A except it has a stationary 7 ft. x 14 ft. platform, (NO HOIST), 3-ton maximum capacity, and 100 bu. grain-tight box.

POWER-DRIVEN SPREADER and SELF-UNLOADING WAGON Model 100, the last word in manure spreaders. Lime spreader attachment. All operations accomplished by direct power from tractor and controlled from tractor seat.

WAGON GEAR-Model 11-A, for Cobey Wagon Boxes. Telescoping reach-pole and adjustable bolsters also permit using any home-made or manufactured wagon box. Extra-strong construction; 3-ton capacity.

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Automotive type steering and roller bearing wheels.

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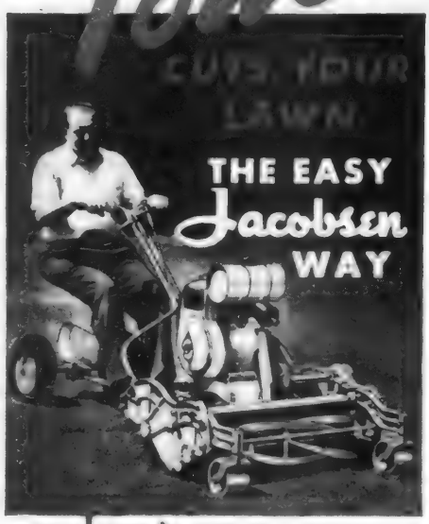

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Engineered throughout to handle big volume cutting, the Park 30 is a mainstay at parks and estates . . . the right machine for any large area grass-cutting job.

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. . . a Jacobsen will enjoy your lawn

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JOHNSTON LAWN MOWER CORPORATION, OTTUMWA, IA.

GRAIN GRADING

(Continued from page 51)

the year 70 pounds to the bushel. After the first of the year we drop it to 68 pounds. The official standard calls for 54 pound corn for No. 1. So with corn, it isn't so much the weight per bushel that puts it into a lower grade, but the moisture content. No. 1 corn can have 14 per cent moisture; it then drops to 15.5, 17.5, 20, and No. 5 can have as much as 23 per cent.

"With soybeans, it's just the opposite. There we have to watch for dockage. They just don't seem to do a very good job of threshing beans yet." Brundige paused for a moment to weigh in a truck. "If we bought oats or rye or flaxseed here," he said, "we would handle it in the same way, make a test so that we would know what we are buying, and base our price on the No. 2 grade for that grain."

Grain Standards Act

"We have been talking a lot about buying No. 1, No. 2 or No. 3 grain from the farmers and of selling different grades of grain and that may be a little confusing," Brundige continued. "Actually there is no grade placed on the grain until a licensed inspector has made an official test. We use the official terms because that is the way we think; and we attempt to duplicate the official standards on all lots of grain because that is the way we, ourselves, have to sell the grain. If we rate grain too high we won't stay in business long and if we rate it too low the farmers will go to another elevator and get a better price. When we sell our grain it is on the basis of No. 2 grade. At the terminal it is inspected and officially graded. If it grades No. 2 the deal goes through as written; if it is No. 1 we get the current premium, usually a cent a bushel; if it goes below No. 2 we take the current discount for lower grades."

Before the United States Grain Standards Act was passed in 1916 there was a great deal more risk involved in buying and selling grain, for no one could count on a standard quality in the merchandise he was buying. The test weight of a bushel was usually made but beyond this there were only vague descriptive terms to describe the grain. Such terms as "cool and sweet," "dry," "damp," or "unsound" give an idea as to the condition of the grain, but they were subject to widely different interpretations by buyer and seller and were used differently in the different grain markets. This uncertainty raised difficult problems in our foreign trade and many complaints were registered with the State Department by foreign buyers. Farmers, too, suffered from the uncertainty of individually applied standards. "I remember driving the five miles to the elevator with my father, back when driving a team of horses five miles was quite a jaunt," Borders recalls. "We would pull up to the elevator and the buyer would feel a handful of grain and say, 'Well, this is a pretty good load of wheat, Mr. Borders,' or he

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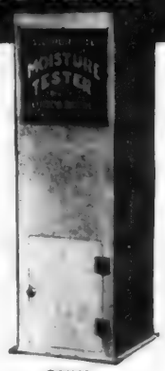
Crop Moisture Tester

AVOID LOSSES AND DAMAGE FROM HIDDEN MOISTURE HAZARDS IN YOUR FARM CROPS

With this new Peirson-Moore Moisture Tester you always know exactly where you stand in harvesting and storing your corn, hay, small grains and seed crops . . . if your crops are in danger from excessive moisture content or not. Indispensible for farmers using artificial crop driers or hay fans.

Now you can make your own tests right on the farm quickly and easily. No chemicals or complicated mathematics. So simple a child can operate. Accuracy of our unit compares favorably with commercial testers costing hundreds of dollars. All steel construction.

Send your order today for prompt delivery or write for further details.



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might say, 'This stuff is mighty damp,' and there was nothing we could do but go along with the price he set."

In 1916, after a number of false starts, the Grain Standards Act was passed. This act, and the amendments that have been made to it, authorize the Secretary of Agriculture to set up standards of quality and condition for corn, wheat, rye, oats, barley, flaxseed, soybeans and for other grains if warranted. He is also authorized to issue licenses to grain inspectors who have proved their ability to carry out this work.

The Official Test

When the Brundige Elevator sells a car of grain to a buyer in Cincinnati or any other market, it is inspected and given an official grade by one of the licensed inspectors there. At most terminal markets the inspectors are employed by the Board of Trade which does the housekeeping for the market, but is not financially involved in any of the trading that goes on. When the car of grain arrives in Cincinnati the railroad company immediately notifies the buyer. The grain buyer then telephones George Butler, the Chief Inspector of the grading division of the Board of Trade, who sends one of his associates, or goes out to the car himself, to make the sampling and start the process of grading the grain. "As soon as we are notified that a car has arrived," Butler says, "one of us drives out to the siding to take a sample. We carry a trier, a canvas, containers to carry back the grain, and some seals so that we can seal up the car again when we are through."

The trier is a five foot hollow probe with 11 separate compartments in it. It is thrust deep into the grain where the compartments are opened and samples taken from different levels. The compartments are then closed and the probe withdrawn and carefully emptied on the canvas in 11 small piles. Usually five probings are made in different parts of the car and the various samples compared to see if the grain appears to be uniform at all depths and parts of the car.

When he is satisfied that he has a representative sample, the inspector pours it into an air-tight container and takes it back to the laboratory to make the tests which will show its class and grade. There are seven classes of wheat: I, Hard Red Spring; II, Durum; III, Red Durum; IV, Hard Red Winter; V, Soft Red Winter; VI, White; and VII, Mixed Wheat. The car that Brundige sent would be sure to fall into Class V, Soft Red Winter Wheat, since this is the wheat of his region. This wheat is specially good for the manufacture of flour for cake, pastry, crackers, and biscuits. "Let them eat cake" has a far different meaning around Kingston, Ohio, than it once had in Paris.

Corn is divided into three classes, Yellow, White and Mixed with five numerical grades and a sample grade for

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PINEHURST FARM,
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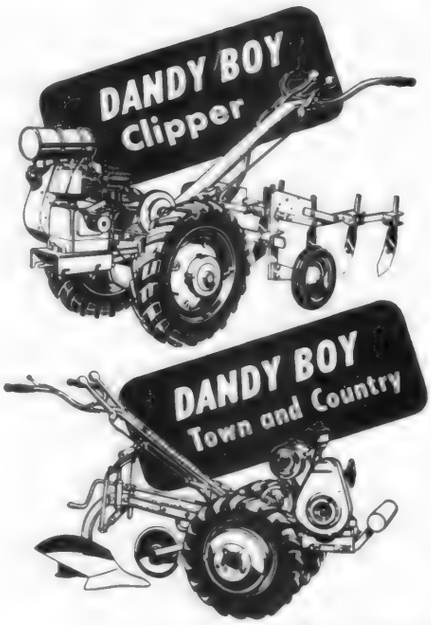

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each class. Other grains are divided in the same manner.

Back in his laboratory, Butler puts the sample wheat through the dockage kicker which separates most of the dockage from the grain; carefully checks the test weight for a bushel; finds the moisture content; buries his nose in a pan of wheat to smell out garlic, smut, or moldiness; spreads a weighed sample on his table and makes a painstaking search for damaged kernels such as sprouted, frosted, or heat damaged, for foreign material that has not been separated by the dockage machine, and for wheat of other classes. When he has finished his tests, Butler fills out an official certificate of grade and sends it on to the buyer. The buyer notifies Brundige of the grade and Brundige can either accept it or immediately call for a review by the Agriculture Marketing Service District Office. If a review is called for, the District Office makes a new sampling and an independent check of the grain.

"The bulk of the wheat that we grade here," Butler says, "is No. 2. We rarely, if ever, get a car of No. 1. It stands to reason that if an elevator had a car of No. 1 which would bring only a cent a bushel premium, and a car of No. 3 which would cost him a three cent a bushel discount, he would blend the two and try to hit the No. 2 grade which is market price. Of course, he takes the risk that the whole car may go No. 3.

"An interesting development of the last few years," Butler continued, "is the number of farmers that are sending in samples of their grain for testing. They send us a quart of grain in an air-tight container and we give them an official test for that sample. Some of them shell out the grain before threshing to see if it is dry enough; some want to check their grain in storage; and some want a test to see if they are getting the best price for their grain. Of course, they are the ones who are responsible for making a fair representative sample of the grain, but for a dollar, we give them the same test we make on any grain. I believe that the farmers who are sending in samples are the ones who are trying to improve the quality of their grain. And there are plenty of things they can do to influence that."

Good Farmers Raise Good Wheat

George Borders, who raised some of the wheat Butler graded, would heartily agree with the last statement. "Aside from the weather which is out of your hands," Borders says, "there are plenty of factors that the farmer himself can control. Take fertility, for instance. These fields," he said with a sweep of his arm, "have been under the plow for over a hundred years. Why over there where that tenant house stands is the site of the old White Swan Inn that was a stopping place on the Zane Trail that ran through here. Henry Clay and Santa Anna both stopped there in

the old days on their way to Washington. And they probably ate food that was grown on these fields. When land has been under cultivation that long, you have to be careful about keeping up the fertility. Proper fertilizer will make all the difference in the world in the test weight per bushel of your wheat.

"Another thing that you must do to produce quality grain is to plant good clean seed that has been treated for smut. That way you will get away from so much weed dockage and have a healthy crop. I rogue my fields, too, to clean out the weeds before harvest. If you have garlic in your fields, fall and early spring plowing for two or three years will knock it out.

"It's true that a farmer is in a pretty bad bargaining position when he sells his grain," Borders concluded, "because most of us don't have proper storage facilities and have to sell when we harvest no matter what the price. But I hate to hear the boys blaming the elevator for the grade they place on the wheat. They have to be fair in grading or we'll take our grain to the other elevator; the competition keeps them both honest. If you get a fair deal on your grading then there is no sense squawking. It isn't Brundige that raises the grain, it's the farmer."

SUGAR BEETS

(Continued from page 81)

Some harvesting machines top the beets while they are in the ground, then lift and shake them free of dirt and elevate them into a hopper which is later emptied into a truck. Others, especially in the non-irrigated areas, lift them from the ground, shake them free of dirt, and then top them.

In places where the mechanical harvester hasn't yet come into use the usual practice is to use tractor or horse drawn pullers or lifters that move straddle of the beet row and hoist the beets a few inches to make hand pulling easier. Hand laborers follow these machines, lifting and topping the beets, and throwing them into windrows or piles for mechanical loading on trucks for hauling to the factory. A good beet worker will top three fourths of a ton of beets a day.

Some extra equipment is required for handling beets. A special planter is necessary and if harvesting is to be done mechanically, a harvester is needed. Growers sometimes pool in the purchase of expensive items. Each grower needs his own tractor beet cultivator. At harvest time he needs a truck. A beet grower who has teamed up with a neighbor on a planter and a harvester might have as little as $2,500 or as much as $5,000 tied up in special equipment necessary to mechanize his beet growing.

Sugar beets lose weight rapidly once they have been pulled and topped. This loss is more rapid through the leaves than from the roots. Prompt topping and marketing cuts these losses. Only those that can be topped and hauled to the dump the same day should be dug.

Returns from beets are based on the yield of sugar and tonnage of beets per acre. Both are increased by taking advantage of the full growing season.

Beets will survive a frost that would kill corn, but when beet leaves are killed by freezing the crop should be harvested. Without leaves they make no sugar.

As sugar beets are dumped at the beet factory or receiving stations a random sample is caught by a "tare basket." If the beets are not clean, if they aren't topped correctly, or are ill-shaped, all of which are covered in the contract between grower and factory, calculations are made to determine the "tare" or deduction from the farmer's payments.

Beet tops make excellent cattle feed in conjunction with concentrates. Yields commonly run from six to eight tons per acre green weight, or one to one and a half tons dry weight. Feeding tests conducted by several agricultural colleges have shown dried beet tops to have a feeding value equal to the same weight of alfalfa hay.

They are good both for growing and

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fattening animals, especially beef cattle. Beet tops should be introduced gradually into the feeding schedule to reduce the possibilities of scouring.

"Raising sugar beets works in perfectly with livestock," says Albert F. Sinner, who owns a large grain and stock farm near Casselton, North Dakota. "Beet tops are high in protein and other digestible nutrients. And even if you don't feed them, the tops can be worked back into the soil. They have a high manurial value and at present fertilizer prices the value of the tops as fertilizer from an acre of beets, one that yielded about 15 tons of roots, is about $22. A ton and a half of dry tops from such a field contains about 81 pounds of nitrogen, 16.5 pounds of phosphorus (as phosphoric acid), and 210 pounds of potash."

Farmers may allow their cattle to graze on the beet field after the roots have been hauled away, though this results in loss of feeding value through trampling. The time cattle are allowed to graze on them each day should be limited, since the crowns left with the tops contain laxative mineral salts.

The tops may be piled in small shocks for curing and later stacked for winter feeding.

Beet silage is a third possibility. Sometimes a little straw is ensiled with the tops to absorb some of the moisture and to help get a better pack in the silo. Or the tops can be run in with corn. Beet silage is fine for dairy and beef cattle, but usually is not suited for sheep. Beet tops and beet top silage are usually fed with hay and concentrates to make a complete ration.

If the tops are not fed, they should be plowed under right after harvest as a green manure.

Some beet farmers haul sugar beet pulp back from the factory and feed it to their stock as silage.

P. J. Donnelly and his son, John, who operate a 700 acre farm in the Red River Valley, near Grafton, North Dakota, find beets "a very profitable crop." Last year (1948) they harvested 88.68 acres that yielded 938.247 tons of beets for which they received $12.6724 a ton, or a total of $11,889.889. Cost of producing the beets, includes such items as $290.58 for processed seed, $195.97 for field preparation (not including plowing) prior to planting. The planting operation, including labor, tractor and planter, came to $176.70. Cultivating the crop five times cost $386.65; hand blocking and thinning required $1,525.44 for Mexican labor that was paid $1.00 an hour. Beet lifting with a mechanical lifter was put at $152, and topping, again using Mexican labor at $1.00 an hour, came to $996. Hauling the beets, loading and other harvesting costs ran to $1,175. Fertilizer came to $315.

These and other lesser costs came to a total of $6,689.89, leaving the Donnellys a $5,200 profit, or $58.65 net return per acre.

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The Donnellys emphasize that their average yield of 10.63 tons per acre in 1948 was lower than usual because of too much rain. "Prior to last year we never had less than 14.25 tons per acre and one year we had 87 acres that grossed us $17,544."

A hundred acres of beets will keep one farmer busy full time during the growing season. If he is practicing general farming, raising stock and other crops, about 20 acres will be his limit.

During the sugar-short war period the government guaranteed a basic price per ton for their beets. Beet prices have fallen two or three dollars a ton since then, and in some areas growers are pretty sore and blame the government for letting prices sag.

The Sugar Act of 1948, which the growers helped write, pretty much determines sugar beet prices. It is administered by the Secretary of Agriculture and a feature of the Act taken from earlier legislation requires him to estimate how much sugar the United States will consume each year. Then, to protect domestic producers, it directs him to apply quotas to imports and domestic production so as to maintain domestic prices at a profitable level.

In practice this usually means restrictive quotas on imports of sugar from Cuba, our principal cane sugar supplier.

Quotas for domestic producers usually are set high enough that they have scant chance of being met. In 1948, for example, the Department of Agriculture set the quota for domestic production at 1.8 million tons of sugar. Actual domestic production was closer to 1.5 million tons. However, if he thinks conditions warrant, the Secretary of Agriculture may restrict sugar beet acreages if beet growers produce over their quotas.

What he attempts to do is keep sugar prices low enough to be fair to consumers, and still keep them high enough to insure the health of the domestic sugar beet industry. And there are sound arguments for both causes. Of course consumers have a right to be concerned about the high cost of living; but the growers have a very real point when they say that the country needs greater self-sufficiency in sugar with the international picture what it is today. They can point to the country's experience with sugar shortages in two World Wars to back them up.

But as things now stand, the Secretary can raise or lower his estimates of sugar requirements, and this in turn determines the quotas for sugar beet acreages.

Of course it isn't that simple. Big consumers, like the soft drink bottlers and others, who want low sugar prices, are usually trying to haul the Secretary one way while domestic producers are trying to haul him the other.

In 1948 the Secretary changed his estimates several times so that they gyrated between 7.8 million tons to a low of 7.0 million. Sugar prices responded accordingly, and jumped around between $7.50 and $8.40 a hundred. With last year's falling sugar prices, beet growers experienced an income decline of about 32 per cent under 1947. This brought returns to growers of $13 a ton.

Returns on sugar beets are calculated from a sliding scale based on two things: the price the sugar refining company gets for sugar and the amount of sugar in the beets. Last year the national average was 14.8 per cent sugar for the beet crop.

Usual practice is for the beet factory to make a preliminary payment to the grower at the time he delivers his beets to the weighing station or factory. This settlement is less than the grower's beets eventually will bring and additional payments are made in line with the sale price of sugar and the average amount of sugar found in all the beets processed by the plant until a final and complete settlement is made, not later than September, of the following year.

THE AUTHOR

RICHARD E. STOCKWELL is a former Wisconsin farm boy who left the farm in body but not in spirit. His parents specialized in poultry and dairying near Neillsville, Wisconsin. After a tour of duty in the College of Agriculture at the University of Wisconsin, he became a radio farm editor in Madison. He went from there to other radio jobs, and between jobs, took additional studies at Harvard and the University of Minnesota. In 1946 he joined the staff of the Minneapolis Star as an editorial writer. Between assignments for the Star he covers stories for other publications. This is his third article in *Farm Quarterly*. One of his aims in life is to own a farm of his own.

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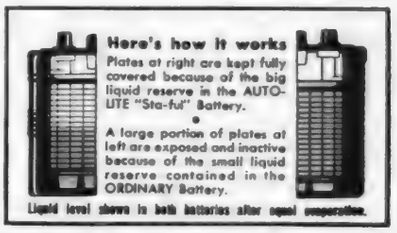
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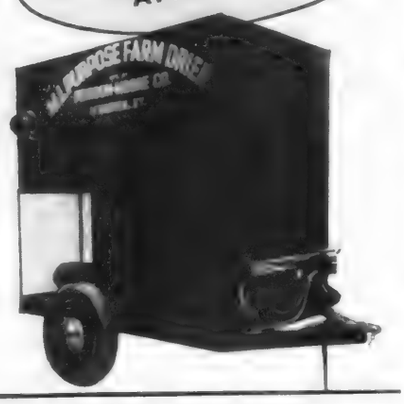

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PUT THE AIR TO WORK

(Continued from page 85)

as economically as the open flame type. If the dryer is to be located near other farm buildings it would certainly be worth while checking to be sure that the particular unit has been approved by the fire underwriters since the use of a dryer not approved by them will add a dollar a hundred to the insurance rates.

There is, of course, a limit to the amount of heat that should be used. Temperatures of 115 degrees or higher will destroy the germinating qualities of seed corn, and other grains and grasses. So, if seed is being dried, the temperature should be held to below 110 degrees. Higher temperatures also tend to increase the fire hazard. A safe rule of thumb is to heat the air to around 30 to 40 degrees hotter than the outside air on days when the temperature is above freezing. The more exact requirements of each crop are shown in the chart on page 84.

The fans that are used on most of the dryers are operated by five horse power electric motors. A more powerful motor might be better, but five horse power is about the most that the rural electric lines will operate. Some manufacturers have gotten around this limitation by having the dryer powered by the farm tractor.

Some of the manufacturers of these drying units are: American Crop Drying Equipment Co., Crystal Lake, Ill.; Blaw Knox Co., Pittsburgh, Pa.; Campbell Heating Co., Des Moines, Iowa; Cascade Manufacturing Co., Portland, Oregon; Durabuilt Manufacturing Co., Chicago, Ill.; Grain Drying Equipment Co., Attica, Indiana; Habco Manufacturing Co., Columbus, Nebraska; Hartzell Propeller Fan Co., Piqua, O.; and Peirson-Moore Co., Lexington, Kentucky. The cost of these units runs from $750 to $1,500.

The Drying Chamber

There are two schools of thought on the question of where to do the drying. The first holds that the drying should be done in the crib, barn or granary where the crop is to be stored in order to save moving the grain or hay more than once. The second group contends that drying can be done best in a special drying house that is used for drying only and is not built or used as a storage unit. Both schools agree that certain requirements must be met whichever type is used. An air chamber must be built so that the heated air can be blown evenly through all parts of the crop. Experiments have shown that the best way to do this is to build a slotted false floor a foot or two above the air-tight floor of the building. The air can then be blown into this area, up through the slots in the floor, through the crop, and out the top carrying the unwanted moisture with it. The space between the false floor and the real floor

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must be kept air-tight except for the slots in the false floor, for air, like growing boys and water, will follow the course of least resistance, and flow out any cracks rather than push up through the grain.

Those who favor the storage-dryer recommend a portable dryer unit that can be moved from building to building where it can be attached to the air duct and set to work. With this arrangement the grain or hay is piled to maximum depth and the dryer is run for the number of days it takes to dry the whole crop.

There are a number of steel buildings on the market today designed specifically for crop drying and storage. They are set up on a cement floor with a slotted steel false floor above. Without the dryer unit, which must be purchased separately, a 2,000 bushel storage dryer building sells for around $750. Some of the manufacturers who are getting into this market are: Armco Drainage and Metal Products, Inc. through its Calco Division in Berkeley, California, and its Southwestern Division in Houston, Texas; Beatrice Steel Tank Co., Beatrice, Nebraska; Butler Manufacturing Co., Kansas City, Missouri; Clayton-Lambert Co., Middletown, Ohio; Curry Steel Products Co., Independence, Missouri; Eaton Metal Products Co., Omaha, Nebraska; Hastings-Equity Grain Bin Mfg. Co., Hastings, Nebraska; and Martin Steel Products Co., Mansfield, Ohio.

Converting Old Buildings

During this period of high building costs and steel shortages, however, a good deal of thought has been given to converting old farm buildings into dryer-storage units. To accomplish this, the hay mow, corn crib, and granary must be made into drying chambers. The hay mow must have its floor calked or covered with paper to make it air-tight and an air tunnel must be built with air ducts running from it to allow the air to be blown evenly through all parts of the wet hay. (This process was described by Prof. R. C. Miller in *The Farm Quarterly* for Spring 1946.) The granary must have a false floor, through which the air can pass, built a foot above the regular floor. An air-tight connection is made with the dryer so that the air is blown in between the two floors and forced up through the false floor and the layer of wet grain above it.

Converting a corn crib, which was designed for the freest circulation of air, becomes more of a problem. In addition to the false floor and the tight air chamber below it, the side walls must be sealed so that the air cannot escape out the sides. This has been done rather economically by using a reinforced kraft paper as a sealer. The interior of the crib is papered to the top of the proposed corn pile with open space above for air escape. An ingenious conversion of the double crib is to seal off the driveway at both ends and use it for the location of an air cham-

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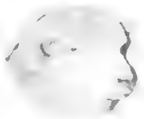

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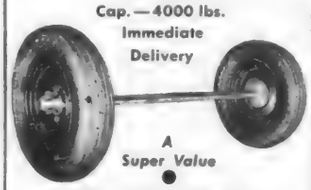

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ber, forcing the air through the inside walls of the cribs and out the opposite side. Plans for converting corn cribs have been worked out by the Department of Agricultural Engineering of Purdue University.

Converting old buildings, which were designed solely for storage, into drying chambers does not produce the ideal dryer set-up. It comes under the heading of a make-shift project. But a farmer, who already has cribs and granaries on his farm, will certainly consider the possibility of converting them before deciding on a new building. If he doesn't have the old type buildings, or if they are in bad condition, he will be interested in building or buying a dryer-storage unit that is designed for both jobs. On the other hand he may decide, as Roswell Garst did, to build a dryer chamber as a separate unit and use other facilities for his storage.

The Seperate Dryer

"When farmers learn the advantages of crop dryers, the old fashioned corn crib will become as obsolete as a dinosaur," Garst says with his usual enthusiasm, and continues, "We have one dryer in operation here on the home place and are building another on a tenant farm. There are a few basic rules that we have found must be followed in building a dryer. First you should have twice as much floor space as you have fan and heater capacity. Now, you're probably wondering why I say that. Well, to make the best use of your blower you want it working all the time, so you divide the building into two parts so that you can be loading one end while you are drying in the other. You shoot the air through the wet grain in one half of the building while you empty the dry grain out of the other end and load it again. Then you switch the air to the wet side and unload the dry."

To operate efficiently with such a system requires an easy method of loading and unloading the drying chambers. Garst has achieved this with the use of a regular farm elevator to lift the grain to the top of the building, a shuttle conveyor to drop the grain where he wants it, and an auger to pull it out the end when it is dry. "The shuttle conveyor is a must with this type building," Garst emphasizes, "and no one need be afraid of the idea. It is not too expensive to build and it does a swell job of distributing the grain." The conveyor is an endless belt working on rollers that carries the grain to its return end and drops it off. The conveyor is half as long as the total length of the building. The conveyor, belt, rollers and all, is suspended from an overhead track so that the whole rig can be moved from one end of the building to the other. Thus loading is started with the conveyor pushed down so that its discharge end reaches the far end of the drying chamber. As this is filled with grain the conveyor is pulled slowly back filling the rest of the drying floor as it goes. To fill the other side the motor is

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reversed and the grain flow moves in the opposite direction. An added wrinkle is an inverted V-shaped separator that rides under the end of the conveyor so that the falling grain is separated into two streams and falls to the sides of the floor. This makes for a more even distribution; which is important in drying.

The floor itself is sloped toward the center where the auger is located. As the grain falls on the high edge of the floor it slips down until the whole surface is evenly covered. The floor is made of slotted steel plates with openings too small to allow grain to leak through, but large enough for the air to blow up through the grain. The auger is covered when the wet grain is loaded into the chamber so that it can be used to empty the dry grain in the other end of the building while the wet is being dried. Garst believes that a drag chain, like the one used on most farm elevators, would be just as good if not better than the auger which he installed.

"Our first dryer is much too big and has too much lumber in it for the average farm," Garst says. "At the time it was built we didn't know exactly what was required so I told the carpenter to build it strong. I said 'just imagine that we might use it some day to store lead in.' He said to me, 'The way you operate, I wouldn't be surprised if you did. Don't worry, I'll make it strong.' So we got a building that is about ten times as strong as we need."

The new dryer is being built with the advantage of the experience and second-guessing gained from operating the first. The plans for the building were made from recommendations by the Agricultural Engineering Department of the Iowa State College of Agriculture and Mechanical Arts. It is to be 60 feet long and 16 feet wide, divided into two 30 by 16 foot drying chambers. The blower will be located in a small shed opposite the center line so that air can be turned into either side of the building. The grain will be brought into the building through the roof opposite the blower. It will be arranged so that the grain will come off the end of the farm elevator and fall directly onto the shuttle conveyor which will distribute it on the drying floor. When it is dry it will be pulled out one end of the building with an auger or drag chain and loaded onto trucks with a minimum of handling.

Garst is hopeful that the drying will work equally well with grain and chopped hay. An objection has been raised, however, that the hay will bridge over the auger or drag chain and the unloading will have to be done by hand. Garst feels that he will be able to overcome this problem, but only time and experience will give the answer.

In using the first dryer Garst has found that he can do a quicker job by limiting the grain on the drying floor to two and a half feet. At this depth he has been able to dry corn from 30 per cent to 15 per cent moisture content in ten hours at 130 degrees, which is as high as he would ever recommend going. "When you pile the grain up to eight feet, as some do," Garst says, "you slow down the process. The grain dries on the bottom layer first and the air pushes the moisture up through the column of grain so that the top layer is wetter after a period of drying than it was when you put it in. With a fairly shallow layer of grain you don't run into this problem. That is one of the reasons I prefer the separate drying unit to the storage-dryer type."

Garst has estimated that the whole building will cost him $2,500 complete with a blower and heater unit that will be operated from the power take-off of a tractor. Working with a thin layer of grain, he feels that the building need not be heavily constructed. The side walls will have very little thrust against them and they only need to be made air-tight up to the grain level of two and a half feet. Since he does not intend to use the building for anything but drying he will keep the walls low and save lumber.

Does It Pay

Garst has tried to figure the minimum saving that such a dryer would make in a perfect crop year. "Of course, the real

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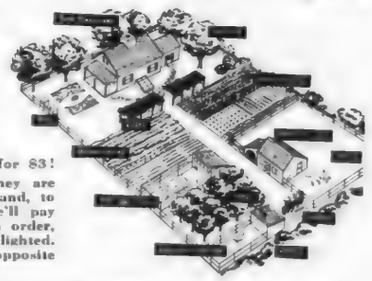

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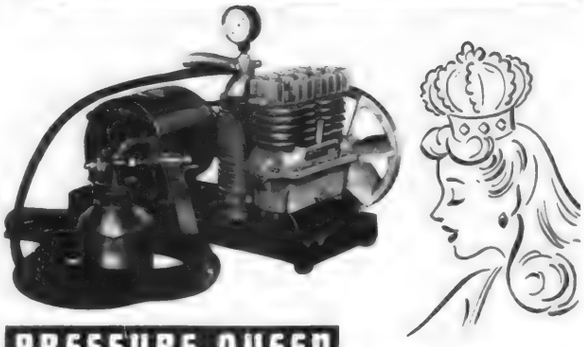

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value of the rig will come in a disaster year," he says, "when it might well save the farmer the value of his entire crop. But I wanted to see if it would pay off in one of our best years."

He has worked out his figures for a 320 acre farm, the smallest, he feels, that could economically use such a dryer. The farm raises 140 acres of corn, 120 acres of oats and 20 acres of hay. The minimum savings are worked out on the basis of saving five per cent of the corn crop by early harvest, with no savings figured for the better price that early corn usually brings, wheat in the rotation instead of oats, the chance to do fall plowing, or the danger of a really bad year. For oats he figures his savings on the cost of windrowing, which is eliminated by drying, and a five per cent savings on shattering, and again does not take into account better prices or the chance of a hail storm or other natural dangers. Hay is a little more difficult to figure, but artifically dried hay has been shown to save up to 35 per cent of the feed value so he credits it with a modest $5.00 a ton in saving.

When his figures are lined up they look like this:

Product	*Cost of Yearly Operation*	*Minimum Saving*
Depreciation (10 per cent)	$250	
Oats	50	$304
Corn	200	300
Hay	144	300
	$644	$904

The Production and Marketing Division of the U. S. Department of Agriculture, with Purdue University and the General Electric Company cooperating, ran practical experiments on drying at Otterbein, Indiana. In April, 1948, they took a single bin of corn that had been filled the previous fall. They found that the 1,035 bushels had a moisture content of 23.75 per cent and had suffered 18 per cent damage in storage. This corn was taken to the elevator and they were offered $1,380 for it as it stood. They then put it into a steel bin fitted with a false floor and dryer and brought the moisture content down to an average of 13.3 per cent. The total cost for this operation, including a 10 per cent depreciation charge of $150 for the equipment, was $173.80. The grain was then hauled back to the elevator and sold for $1,938.74 which gave them a net saving of $384.94. It is obvious that if the depreciation cost could have been spread over several drying operations the savings would have been considerably higher.

Leonard Foutz of Middletown, Ohio, who began using a dryer last fall, points out one way that cost can get out of hand. "I had around 2,000 bushels of corn in the dryer last year, and the dryer worked perfectly. The only trouble was that, when I was through, I found that I had lowered the moisture content to 10 per cent. I was going to feed the corn, but if I had sold it I would have lost that extra weight without gaining a thing and I'd have paid for drying to boot. As it was my drying cost was higher than it should have been, but it didn't affect the feed value of the corn. This year I will get the elevator to run a moisture check on the crop while it is drying."

The Experts Differ

The work in this field is still new and the experts differ as to the best drying methods. The Purdue workers point out, for example, that their findings show that while Garst's thin layer of grain dries faster, the deep columns of grain in the storage drying units can be dried more economically. Still another group of experimenters argue that heating the air is an unnecessary expense under most conditions. The final answers to these problems have not been arrived at, but there is complete agreement on the usefulness and need for crop dryers.

NOTE: Working plans for the Garst dryer can be secured by writing *The Farm Quarterly*, 22 E. 12th St., Cincinnati, Ohio, and enclosing $1.50 to pay cost of blueprinting and mailing; information regarding the storage-drying buildings can be had by writing any of the companies listed; plans for converting old buildings are procurable from manufacturers of drying units on page 112 and from state agricultural colleges.

THE STARKS

(Continued from page 60)

magnificent foliage and I could see, even at a distance, that it held a full crop of yellow apples. I scrambled up to examine the tree. The apples were the shape of Stark Delicious and weighted the branches to the ground." Paul Stark waited until A. H. Mullins, the owner, came home. He said that the tree had "just grown" up there on the mountainside. Paul signed a contract to pay him $5,000.00 for the exclusive rights to propagate this chance seedling. He took a handful of scions back home to Louisiana, Mo. One of his men shinnied up a Delicious tree and top-worked the scions. "It usually takes two or three years to get a crop from a top-worked limb," Paul says, "so imagine my surprise one morning a few months after those scions were top-worked to find them a mass of blossoms. I thought they would drop off, but they stuck and produced a crop of yellow apples so heavy that the limb looked like a giant cluster of oranges."

Stark Golden Delicious, as it was named, is an exceedingly young bearer and very prolific, so the catalog claims, and it lacks the bad features of other yellow apples and keeps well. Red has always been a favorite apple color, but the Stark Golden Delicious overcame that prejudice and is now second only in popularity to the red.

Stark Golden Delicious, like Stark Delicious, is a nature-bred chance seedling. Research by competent authorities indicate that the apple was pollen-sired by the Golden Reinette and the seed borne in a Grimes Golden Apple. Fruit trees do not come true to seed, and scions of the desired variety must be cut from a parent tree and budded or grafted onto a seedling understock, to reproduce the kind of apple you want. If you plant 10 seeds from a single apple you will get ten different apple varieties, with almost every possible size, shape, color or flavor. The chances are thousands to one that the variety will be better than the fruit in which the seed developed. But when you find the good one, it's like finding a gold mine in your own back yard.

Sports can be contrasted to seedling type of variety improvement in that they are a variation in a single limb of a tree and all trees propagated from scions cut from this changed limb will produce trees of the new variety. The original sport on a tree starts with a chromosome or gene shake-up in a single cell of a bud. Chromosomes and genes which are the character-determining factors in plants and animals can be changed in many different ways; they may be doubled or halved, or a single gene on a chromosome that regulates color can change to produce such an apple as the Starking Delicious which is all-over-red, or the gene that regulates season can be changed to produce an early-maturing type which gets full ripe two or three weeks ahead of the parent type, such as the Starking Delicious peach, an early-maturing bud-sport of Burbank July Elberta. Chromosomes can double to produce sports of giant size such as the giant Jonathans which are now under test. All shoots and limbs growing from this changed bud will produce the new type of fruit.

The Surprise Package

Chance seedlings have been the main source of Stark's new varieties. When an orchard owner spots a departure from the usual in his orchard, he thinks first of the Starks, and dispatches samples to Louisiana. The opening of boxes of samples of strange fruits is one of the most exciting chores in the Stark plant and none of the eight partners wants to

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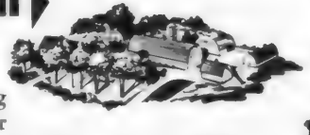

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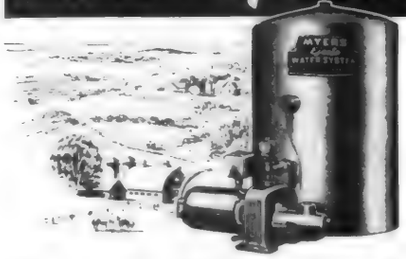

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be absent for this daily ceremony. "Out of every hundred packages will come not more than one or two possibilities," Paul Stark says. "If we find something promising we buy the rights to develop its possibilities. Of many thousands of experiments we come up with only one or two which are worth putting on the market.

The packages reveal giant fruits, dwarf fruits, lop-sided and strangely colored fruits. It is the chance that another fortune like the Delicious will come along that keeps them opening packages with hope and faith. The giants, which would seem off-hand to be commercially valuable, are too often coarse in texture. A fine-textured giant would be welcome.

Around the Stark plant they still talk about the tragedy that happened back 20 years ago.

It was in the fall of 1929 that Lloyd Stark sat opening a box which had just arrived. Growing from one twig were three apples, which were at the same time striking and grotesque. They were marked off in quarters of alternate red and yellow—the rich yellow of the Stark Golden Delicious and the brilliant red of the Stayman Winesap. So unusual were they that he at first decided that someone had played a trick with a paint brush. He rubbed the apples to see what would happen; the color did not come off!

The lines which divided the colors ran straight from stem to blossom end. Then one of the apples was cut in half, and it was discovered that the characteristics did not continue into the flesh. However, the other distinct characteristics of the two types of apples were present—clear to the core. The nearest approach to anything of this nature had occured several years before when an apple with alternate sweet and sour sections had been reported.

A telegram was sent immediately to A. C. Campbell of Chelan, Washington who had sent the box, requesting details of the finding of this phenomenal specimen. Back came the reply that the sport had been brought to his attention more or less by chance, and that although we had asked his workmen to mark the tree, they were not positive whether or not they had marked the right one. A reward failed to bring about positive indentification by any of the workers.

The only course was to wait until the year following to learn if the unusual sport might repeat itself. A close watch for three consecutive years failed to turn up a recurrence and the Starks were forced to conclude that in pruning the trees the branch which produced the strange fruit had been unwittingly snipped off.

The Starking Delicious, a deep red, early-coloring bud-sport of the Stark Delicious which won the Wilder medal, the Academy Award of horticulture, the Starking Delicious Peach, and the Lambert Rainbow Stripe Cherry, are all sports

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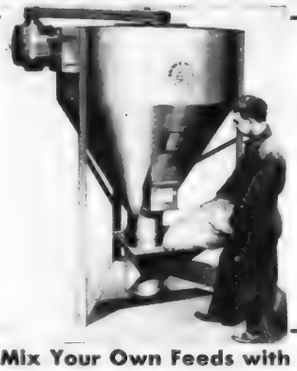

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which came in "over the transom" of the Stark office.

Occasionally a freak turns up. Although it may not appear to have commercial value, the Starks have learned not to overlook a bet. A Hindu oil man married to a Missouri girl who knows the Starks recently sent them ten cuttings of a Near East grape vine. It is claimed that wine made from this grape will make old men young again. The cuttings were planted. "An ordinary grape vine cutting grows four to five feet the first year," Paul Stark says. "This Turkish vine grew 25 feet. If the grapes pass along that vitality to men, WOW!" News has leaked out and the Starks already have advanced orders for this grape. Paul adds, "An old man who recently married a very young woman, wants enough to plant a vineyard."

Mail Order Trees

In the mansion-like offices of the Stark Company, 150 to 175 clerical workers keep books and sort out the orders. Across the tracks from the office are five acres of packing sheds. The sheds are used in the fall, winter and early spring for the storage and shipment of fruit trees and ornamental shrubbery. The buildings, which have earthen floors, are kept moist and cold for the benefit of the trees. These are packed in ricks and bins, 16 to 18 feet high, millions of them. A packing material called "shingle-tow", made of thin shavings of red wood, spreads a rich woodsy smell throughout the sheds. Orders are given to shipping clerks who go from bin to bin pulling out the trees and shrubs called for on the order. These are taken to an inspection department where each tree is inspected and checked off. In the shipping department the roots are packed in moist shingle-tow, the whole bundle is wrapped in triple-ply water-proof paper, addressed, and sent on its way. Large orders are boxed. Foreign orders are packed in shingle-tow, placed in a regular shipping box and then in a second heavier box. The Starks call this their "round-the-world package". Trees come out of this package in Syria and India as fresh as when they left Louisiana, Mo.

The trees are sold throughout the world by agents and direct to individual buyers. With each order there is included a booklet on planting, pruning, fertilizing, and spraying. Anybody with a sound reputation can become a Stark agent. Most of the agents make fruit tree selling a part-time job.

The Starks are working on an all-purpose spray which they also sell. At the present time this spray will protect home orchard trees from most of the common insects and diseases. The Stark catalog lists 230 varieties of fruits and about as many more ornamental shrubs and flowers.

Last year the company shipped millions of trees of all kinds. These were grown on the four thousand acres the company owns and operates around Louisiana and at branch nurseries at Rockport, Illinois; at Porum, Checotah and Stigler, Oklahoma; Farmington, Arkansas; Marionville, Missouri; Dansville, New York and a seedling contract at Zillah, Washington. The scattered branch nurseries are insurance against bad weather which may damage the crop in one locality. All of the plants are shipped from Louisiana, Mo. The branches may receive their seedlings and grafts from the home nurseries but after they are ready for sale they are shipped back to Louisiana for inspection, packaging and shipment. At Louisiana and the branch nurseries, millions of trees and shrubs are growing up. Trees for fall planting are shipped in October, November and early December. Those for spring planting in February, March, April and May. The Louisiana plant regularly employs about 525 men and women in the office, fields and packing sheds.

The Green Thumb

The process of getting a new variety on the market is complicated and takes several years. For example, when Paul Stark carried scions which he cut from the Stark Golden Delicious parent tree in West Virginia, back to Louisiana, they were top-grafted on a bearing tree. A scion is a section of a twig five or six inches long from a tree, and containing two or three buds. In top-grafting, that part of the scion on the down limb part is cut diagonally. A similar diagonal cut is made on the

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twig of the growing tree. These diagonal cuts are split lengthwise to make an interlocking graft which brings together the bark cambium layers of the two parts. The graft is then taped to give it strength and to hold it together, and labeled for identification. This graft will bear fruit in about two years.

In a new variety it is necessary to check whether or not the sport will reproduce itself. The seeds from the fruit are not used, but scions are cut from the sport limb. These are in turn grafted to roots and are then ready to be planted and grown for two years to produce strong, vigorous, well-branched trees.

If the sport reproduces itself and is definitely superior to all other of its type and season of ripening, a patent is secured and it becomes illegal for anyone else to make a graft of that particular fruit. If a variety is selling well a number of trees are set out in the scion orchard as a source of propagating wood for the new variety. Each year scions are cut from the trees in the scion orchard.

The Starks use the whole root as it comes from the ground, not a piece root. They have learned this produces a hardier and more quickly maturing tree. Although the Starks pay as much as $10,000.00 for a single bud-sport limb of a tree, the planter can buy a tree of this variety for less than $3.00 each.

Trees may be sold in the "whip" stage, which is a single, straight, whip-like branch growing from the original root graft. These are preferred by some orchardists. Most buyers like trees to be older, two-year trees with side branches.

The process of grafting the scion to the roots is called bench grafting. The Starks employ about 75 grafters at Louisiana and the branch plants, who are old experienced hands at the business, and about the same number of young lads who tape the grafts when they are made. A good man can make between 2500 and 3000 grafts a day. A razor-sharp pocket knife is used for this. The foreman in charge says even the old hands occasionally shave off a knuckle or the end of a (green) thumb.

The ambition of the Starks is to have every dooryard in America shaded by a Stark fruit tree, and they push their dwarf varieties for the small home owner. The production of a dwarf tree is almost an assembly line process. The roots are those of a hardy, rugged crab apple which are very thrifty. These crab apple stocks are allowed to produce yearling-whips which are then cut and a three-inch piece of a dwarf is grafted to this trunk. Above this three-inch section is grafted a scion from any desired variety. The small section from the dwarf tree has the power to dwarf the entire growth. The variety may be Dwarf Starking Delicious, or Dwarf Stark Golden Delicious. Only the tree is dwarfed, not the fruit.

The Starks have discovered that the color of a fruit is a big factor in its sale, especially on the market, but in the long run flavor is quite as important. They have never quite educated the public into believing that the color of an apple has nothing to do with its flavor. They point out that there is a distinct difference in flavor between apples grown in different parts of the country and that a tourist who likes the flavor of an apple which he bought from a roadside stand in Oregon would probably get a different flavor if he picked up one of the same variety grown in New York.

The Starks are very jealous of their repuation for reliable trees. "The nursery business would make an honest man out of the devil," one of them said. "Once a tree grows up and bears fruit it's so dog-gone permanent that we can't afford to sell anything but good trees. That is, if we want to stay in business." The Stark trademark is a bear, the inference being that Stark trees bear fruit. They point out, too, that the five bumps on the blossom end of a Delicious apple spell out S-T-A-R-K. The letters are not visable to outsiders, but to the Starks they are quite plain. This gives them confidence in the future.

THE AUTHOR

JOSEPH H. FLORY was born on the banks of the Wabash and still lives in Indiana. After a career in Washington as a government employee he went into the banking business, and finally into selling after he worked out a balance between his first love, feature story writing, and his bread and butter job, selling. He made an extended stay at the Stark plant at Louisiana, Missouri, while preparing the *Farm Quarterly* article and was thoroughly sold on the contribution the Starks are making to American farms and orchards.

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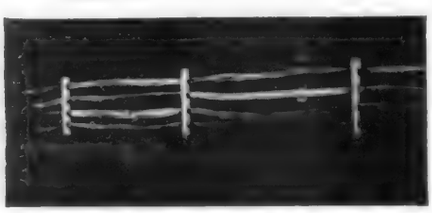

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you know anyone who wants to buy a good dairy farm, send him around. I bought this place before the war and since then it's been one headache after another and a big batch of bills at the end of each month. The only possible value I've got out of owning the farm is that I have been able to deduct some of the loss from my income tax."

Fain's arrangements with the tenant are simple; he employs him on a monthly salary and furnishes him with a house, a garden plot, two pigs a year, and the right to keep a flock of chickens.

"My first tenant slept all day. The second was a good worker except that he had an ungovernable temper and beat the cows, his wife, his kids, and even ran me off the place with an iron pipe once because I dared ask why the butterfat content had fallen off so remarkably. The present tenant is an easy going guy who will work well if you tell him each move to make, but I can't get to the farm more than once every two or three weeks so he doesn't make many moves. But these fellows are just dandy compared to the third tenant. He was a beaut." Fain closed his eyes and shook his head. "He was my war baby. I hired him when the evil-tempered boy left to work in a war plant. He answered an ad I ran in the paper and convinced me that he was a dairy farmer from way back. I hired him and he and his wife moved in. The next time I visited the place I found that his father and mother had moved in along with a sister and her kids. A couple of weeks later my wife went out to the farm and told me that some more relatives had arrived. When I got out to the place again it looked like a transient camp; they were even sleeping in the hay mow. The place wasn't being kept up, the machinery was out in the snow and the barn and house were both filthy. About two months later I got an emergency call from the veterinarian who was looking after the herd. I rushed out and found that every cow had a bloody rag tied to its tail and some of them had their tails chopped off above the switch! My doctor has warned me about even thinking of this incident," Fain said, looking as though he might have an apoplectic seizure at any moment. "My tenant's father had discovered that all the cows were suffering from what he called Wolf Tail, and had split open their tails or hacked them off. My registered cows! The vet was furious. He had called me out because they were planning to bore holes in some of the cows' horns to stop Devil's Horn. And you ask me what I think about tenants."

Fain admits that he knew nothing about farming when he bought the place and that he has given very little of his time trying to manage the farm. He also agrees that the house he has on the place doesn't attract the better class farmer, since it is not comparable to the surrounding tenant houses, but, he points out, it would cost $3000 to bring in the plumbing and modernize the place. He has frequently sold heifers to pay farm bills rather than put more money into the place and the herd is not as big now as when he started. He is convinced, however, that if the tenants hadn't robbed him blind, he would have made a success of the place.

Farming Requires Management

Part of Fain's difficulties may have come from a bad selection of tenants and some of his troubles certainly came from lack of management, but the system he followed in employing a farm operator has worked out well under other circumstances. Very often retired farmers, who want to keep their hand in the game, may employ an operator and pay him on a straight cash basis and supply the management of the farm themselves. Under this plan the landlord owns all the livestock and equipment and pays for all seed, lime and fertilizer.

Fain might well have followed the example of some of his fellow city owners who do not have the time, or are not qualified to give proper supervision. They employ a reliable farm management service to supervise their farms. Good farm managers are trained not only to obtain more profits this year, but also to build the farm for continuous benefits in future years.

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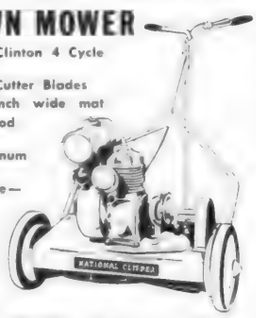

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Tenants are perfectly aware that the manager represents the owner, but they also realize that the manager is out to introduce practices that will make money for both owner and tenant.

Pitfalls

One of the pitfalls to good landlord-tenant relations is a farm in which the owner has over-invested, or one that is too small or not productive enough for the tenant to make a reasonable income, and also give the owner a satisfactory return on his investment. Both owner and tenant usually become dissatisfied, although neither is to blame. In such cases a readjustment of the farming program may increase the farm's income so that both will benefit. Specialization in dairying, or poultry, or cattle and hog feeding may lift the farm out of the red.

Special crops to which the farm is suited also may be the answer to increasing the farm's income. An Indiana priest put money into the pockets of his parishioners when he discovered their sandy soil produced excellent strawberries. He organized the farmers into a producers cooperative, and within a short time the quality of the berries became widely known.

It may well be that none of these alternatives apply. In that case, the owner will have to enlarge the too-small farm by rental or purchase of additional land. If it is a case of over-investment, the owner may have to realize that he has been took, and write some of the investment off as a loss.

Another mistake that is easy to make is taking on a tenant to operate a specialized farm without checking his qualifications. A good wheat farmer, after all, may not know home plate from deep left field about the poultry business. This should also be kept in mind when a landlord is considering changing the farm operation and keeping his same tenant.

Landlords who are used to dealing with other business men often make the mistake of making too sharp a bargain with their tenant. A slick horse trade may make the landlord feel like a clever bargainer, but he should remember that the tenant has a whole year to get even.

One difficulty that comes up on many of the crop sharing arrangements is the tenant's financial status. If the tenant is not financially able to swing his part of the arrangement, the enterprise will suffer. He will try to get by with inadequate equipment: he will be unable to contribute his share toward seed and fertilizer and will try to economize on these important

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items; he may not be able to hire extra labor at a time when this help may mean the difference between planting a wheat crop before the snow falls or not.

A variation on the usual share arrangement has been worked out by landlords who want their farms operated on a share basis, because they feel the incentive program makes better farmers, even though their tenants may not be in a position to handle the machinery purchases. The Dunlap farms are operated in this way.

John Dunlap, Jr., who manages 12,000 acres of farm land in Picaway, Ross and Madison Counties in central Ohio, is the sixth generation of his family to farm in this part of the country.

As it stands today, his land is divided into 28 farms, all but eight of which are operated by tenants. The eight are direct operations in which Dunlap employs salaried managers. The tenants work on a third share basis in which Dunlap furnishes the farm, all of the equipment, management and bookkeeping, all breeding stock (cattle, pigs and sheep are the main cash crop), all lime, rock phosphate, and grass seed and furnishes two-thirds of crop seed, fertilizers, feeds not grown on the farm, and gasoline and oil for the equipment. The tenant supplies all labor and his third of seed, feed, fertilizer, and gasoline and oil costs. The division of the cash returns is on the same basis, one-third to the tenant and two-thirds to the landlord.

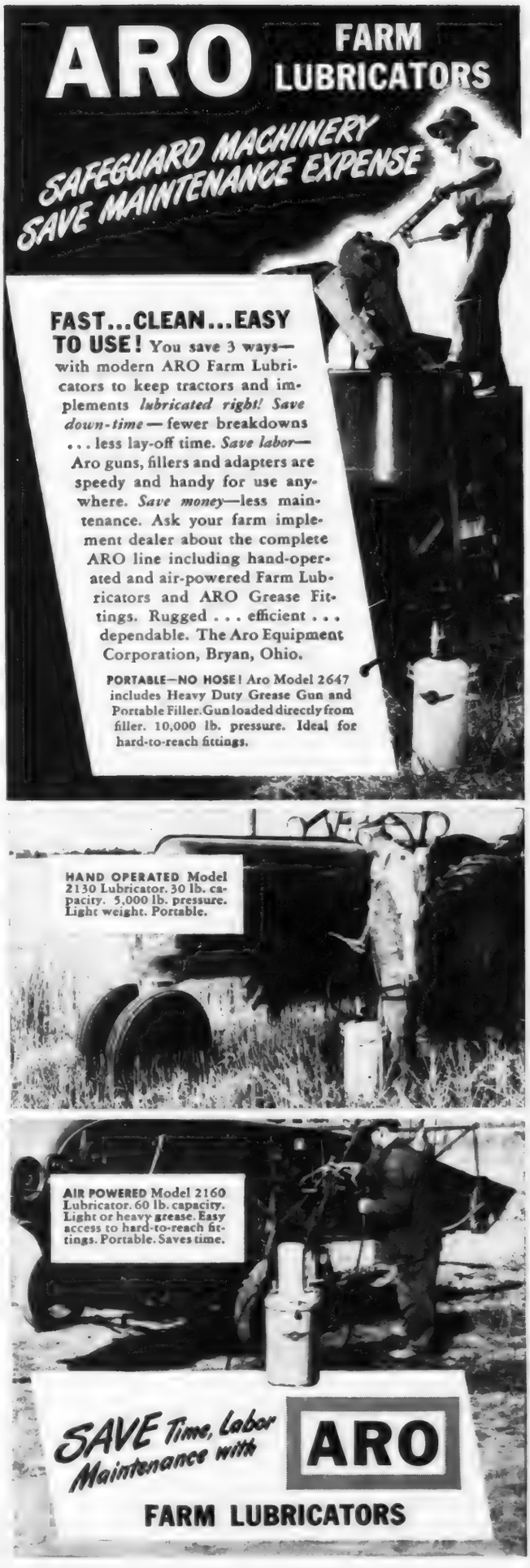
With an operation this size, Dunlap has found that it pays to apply some practices that have long been accepted by industry. All equipment is standardized so that the owner can keep a supply of spare parts on hand and mechanics employed by him will be familiar with all of the machines; all purchasing is done in bulk to take advantage of better prices on carload purchases; Dunlap runs an elevator for shipping and storing grain and for mixing feeds. All equipment is mobile and each farm has sufficient equipment for normal operation, but Dunlap also has some heavy equipment and a crew of men that can be used on any of the farms to help out when they are needed. During the wet spring of 1947 this crew was thrown full force onto any land that was dry enough to stand cultivation. One day and night they had 35 tractors operating on one farm and managed to plow and prepare the land and put in the corn crop before the rains came again.

"Most of our tenants," Dunlap explains, "have come up through a sort of apprentice system. They have worked for us on the service crew or on one of the directly operated farms. They have had a chance to get acquainted with us and our methods and we have been able to see their work and get to know them.

"The men we pick for tenants," Dunlap continued, "are the ones we feel are honest and hard working, of course. We want a man who is really interested in agriculture and is conservation minded. Our tenants all have a good knowledge of farming to start with, but we like a man who is willing to take instruction. We try to keep up an educational program by holding monthly meetings of all the tenants at which we discuss our problems and map out the general program. They also get a chance to talk to some experts in different fields since the engineers from Goodyear Tire Company and Massey-Harris are often down here testing out new equipment.

"Another thing we always consider in a tenant," Dunlap concluded, "is his family life. We want men who are married to women who love farm life. That is really one of the most important factors in a farmer's success, whether he owns his own farm or is a tenant."

Dunlap uses a standard written agreement with all of his tenants. At the beginning of each contract year, which starts on March 1, he and the tenant go over the lease and make any changes necessary to adapt it to the particular farm. Though the lease runs for only one year, it is renewed automatically from year to year unless notice to terminate is given seven months in advance. This type agreement has given the tenants a feeling of security which pays off in land improvement.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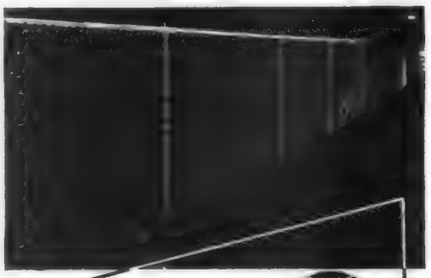

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One of the tenants, James Hooks, has been with Dunlap for 17 years. Hooks has saved enough money to buy himself a farm and has asked Dunlap to keep on the lookout for one, but he intends, when he buys it, to go on farming for Dunlap and let out his own farm on halves until he gets enough money to equip it.

"Comparing the thirds and halves systems," Hooks says, "it is about six of one and a half dozen of the other. I know fellows who are doing well on halves but they have to have worlds of money tied up in equipment. At that, I have the use of better equipment for the different jobs than they do. If you have a fair landlord it doesn't make much difference whether you farm on the thirds or halves, you will be able to work out a fair division. We've done it here and I have been with Dunlap in good times and during some pretty bad times in the early thirties. We've always made out though."

Management Is A Joint Affair

As part of his contribution to the enterprise, Dunlap furnishes management help to the tenants. One man spends full time taking inventory on all of the farms, keeping an accurate account of all livestock, grain, feeds and produce. The office, which Dunlap maintains, keeps books for all of the farms and makes a monthly accounting to the tenants. Beside his own work in management, Dunlap employs a farm manager, Harley Mace, a big, friendly, grey-haired man with plenty of farming know-how, to work with the tenants. Mace visits the farms and helps with day to day problems; plans the overall operation with the tenant; and is available at all times to help out in an emergency. "And I really am available," Mace says. "All of the tenants have telephones and they can reach me at the office or at home or even when I am driving my car, for I have a radio telephone installed. As long as I am close enough to hear the horn blow I will answer the telephone. You know, sometimes I am awfully tempted to turn the darn thing off and forget telephones for awhile, but I guess my conscience would start bothering me."

Most of Mace's work is with the newer tenants, like Dan Eitel, who says, "I worked as a farm laborer with Uncle Jim Hooks and, after the war, I worked for Jack Dunlap on maintaining and repairing farm equipment, so I know something about farming, but I've got a lot more to learn. Harley Mace helps me out a lot. We get together, Harley and I, and plan the crops that I will plant in each field; which ones we will lime and which ones we will keep in permanent pasture. We have planned the whole livestock

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program for my place and he helps me out on any problems that come up.

"If I get an idea about how to run the place that is different than what Jack or Harley want," Eitel continued, "Harley usually talks me out of it. It's different with Uncle Jim, over there, and the other older men. Harley knows they have had a lot of experience and he will usually let them have a try at some new thing. If it works, well we may all be trying it next year."

Most of the men feel that the accounting system set up by the landlord has relieved them of a job farmers hate, and do rather poorly. At any time, they can go over their records and make comparisons with their present operating methods to find out how they are doing.

A Third vs. A Half

Tenant-landlord agreements throughout the country are worked out by the two parties to fit their situations and to fit in with the pattern that has been established in their neighborhood. Sometimes inequalities occur when they stick too closely to the prevailing pattern. An example of this would be when a landlord is offering a better farm with better buildings than any in the area or, on the other hand, when the farm is not as productive or in as good condition as the ones that set the pattern. One good way to test the fairness of the distribution of the crop is to total the contribution of each of the parties to producing the crop and divide the income on the basis of the contribution. In this way each is getting out of the enterprise about what he puts into it. An example of such a tabulation is shown on page 34. This one was worked out by the University of Illinois for a farm which was worked on halves.

In comparing his crop division with the more usual half-share plan, Dunlap says, "Farming on the halves works out all right if the tenant has enough capital so that he can equip himself with modern machinery and keep going. We did farm that way here for a while, but we found that we were constantly involved in trying to finance the tenant. On the thirds we retain a little more managerial control and we are sure that our tenants are well equipped and that their equipment is in good shape. We know that they have good breeding stock because we supply it. If special equipment is needed to improve their farming, it is available. Take our heavy offset disc, for instance. We tried three different types before we got the one we use now, a disc that weighs over a ton and is perfectly suited for this soil. No tenant could afford to experiment that way, and we won't be able to afford *not* to use such equipment when prices go down and we have to produce for less.

During the war many agricultural leaders were looking ahead to farm tenure problems that would follow. Those problems appeared so important that a committee of 13 experts from as many agri-

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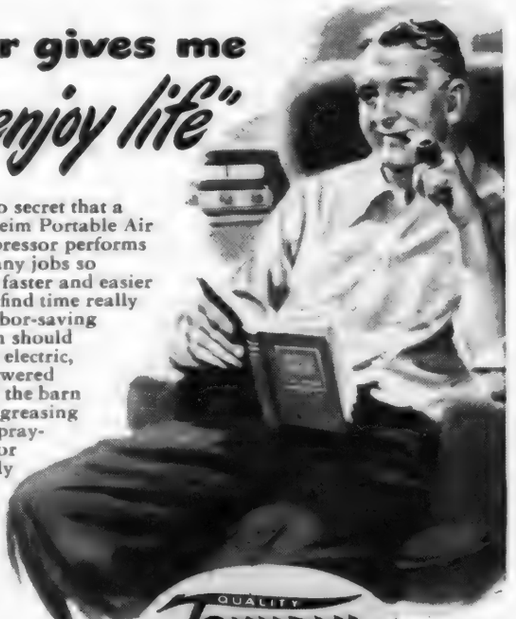

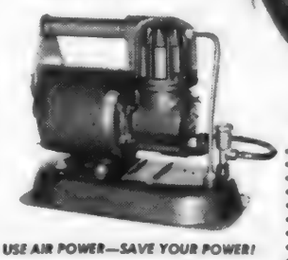

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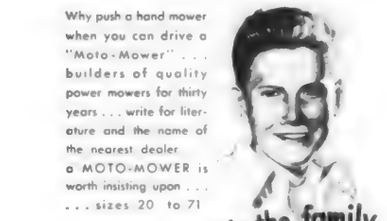
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cultural colleges in the Midwest was formed to make a survey. Noble Clark of Wisconsin, was named administrative adviser, and Joseph Ackerman, manager of the Farm Foundation, served as secretary. After pointing out that unwise tenancy often leads to impoverishing both the tenant and farm, to unprofitable farming, and to progressive deterioration of both the soil and farm improvements, the committee urged that, "Appropriate steps should be taken to improve landlord-tenant relations." These eight steps were recommended:

(1) The use of leasing agreements which provide a basis for a system of farming that is profitable for both the landlord and the tenant. (2) Adherence by the tenant to good farming practices, and the exercise on his part of every reasonable effort to prevent undue deterioration of the landlord's property. (3) Constructive effort on the part of the landlord to provide a farm large enough and profitable enough, and with improvements and housing of a character to encourage the tenant to put forth his best efforts. (4) Assurance by the landlord that his tenant will be given full credit for any needed improvements he makes on the farm at his own expense. (5) A fair division of income and expenses between landlord and tenant in both good years and bad years. (6) Assurance to a competent tenant that his lease will be continued through a period of years; and a clear understanding between landlord and tenant that adequate notice will be given when the lease is to be terminated. (7) The use of written agreements that contain a brief statement of the important items of agreement. (8) Employment of competent management by absentee or other owners who are unable to manage their farms properly.

These rules should certainly be helpful to any landlord, but there are no set of rules that will insure good human relationships. Even from a business point of view, the friendliness and understanding of the two partners to the agreement are just as important as is the contract. It is doubtful if much of a profit would be made on the farm if the landlord and tenant were engaged in a feud. Even if the profit were produced neither of them would want to continue the arrangement.

The most carefully drawn contract could not produce a friendly relationship, nor could it cover the thousand and one little things that come up to plague the partners. Little things, like the division of 50 cents worth of printed feed sacks, can grow in importance in the minds of people if they are not willing to give and take. The only sure-fire rule that is guaranteed to improve the human side of the relationship is the one that begins, "Do unto others . . . . . "

THE AUTHOR

RUSS CUNNINGHAM will confess to having written some fiction, but his greatest love is writing about farm problems and farmers. Born and raised on an Illinois farm, he succumbed to the lure of the city and became a newspaper reporter in Denver and later in Chicago. "I found I couldn't get the country out of the boy," he says, "so I studied agriculture and became an assistant county agent." Later he helped edit a farm magazine and is now agricultural consultant for an advertising agency.

THE WALKING HORSE (Continued from page 40)

couldn't run fast enough. He worked hard at it but there were too many faster horses lined up with him at the starting line, and eventually Black Allan went back to pasture.

During the following years Allan, for all his noble bearing, was bandied about from owner to owner for small amounts of money. At one time he was traded for a cow. Horsemen who saw him, however, called him "a most beautiful, perfectly conformed, and kindly disposed horse." When Black Allan was 17 years old he came into the hands of Jim Brantley of Manchester, Tennessee. Brantley saw the possibilities of breeding this old stallion to large native farm mares to produce combination horses. Black Allan's offspring were outstanding, easy gaited horses, their way of going permitted them to canter down rows of crops easily on a straight line. They were known as Plantation Horses in some parts of the South until Tennessee horsemen tagged them "Walking Horses." The name stuck and has become the most widely used one for the breed.

Black Allan's offspring were immediately popular. Farmers saw in these medium-sized animals a horse that could do a variety of jobs. The acceptance of Walking Horses by farmers pleased Brantley, for he had, from the beginning, thought of them as farm horses. Here was a horse that could be ridden for the cows morning and evening, haul the kids to school, look good in harness on a Sunday afternoon ride, or pull a sled piled high with corn fodder.

The Walking Horse has had his share of publicity; Tennessee breeders have seen to that. In fact, there are horsemen who say that he has been pushed too hard for his own good. Originally intended as a utility animal, he is now being bred for the shows. However, the farmer who owns one is likely to overlook the fine demands made by the show ring and value his animal for what he can do to bring him pleasure and profit as a head of livestock.

The three natural gaits of the Tennessee Walking Horse are called the flat-foot walk, the running walk, and the canter.

The flat-foot walk is the slowest of the three and enables the horse to cover from four to five miles an hour. His next speed is the running walk which enables him to cover six to eight miles an hour. It is this gait that places the Walking Horse in a class of his own. He is born with this gait; it is not acquired. The running walk starts like the flat-foot walk with the right front

and the left rear feet in motion at the same time. As the horse picks up speed and shifts to the running walk the hind feet usually overstep the front feet, sometimes as much as 18 inches. The hind foot strikes the ground at the same moment as the diagonal front foot. His long strides give the Walking Horse his gliding movement.

When the Walking Horse goes into high gear his gait is a graceful easy canter that has earned him the name of "nature's rocking chair." The canter is a refined gallop that has rhythm and spring but little jolt or jar for the rider.

It is said that the Walking Horse has a gait so smooth that the rider can carry a glass of water on each outstretched palm and not spill a drop. There is also a claim that he can carry his rider and a basket of eggs eight miles to the grocery store in an hour, and never break an egg.

The peculiar walking gait of the Tennessee Walking Horse is a characteristic that is passed from generation to generation as what the geneticists call a dominant trait. The offspring of Walking Horses always have the walking gait. Usually an ordinary farm mare, regardless of her gait, if any, will, when bred to a good Walking Horse stud, bear a colt that walks like his sire. If he has the right gait he is as much a Walking Horse as the blue bloods that win the show ribbons, for it is his method of setting his feet down, and not his papers, that makes him a "walker."

Chambers Perry keeps a string of Walking Horses on his large farm near Mt. Olivet, Kentucky. His former farm manager, Earl Curtis, says, "Many's the day we were in the saddle from morning till night. We taught the horses to help us open gates by turning sideways so we could unlatch the gate without dismounting. Every horse we kept was farm broke for every type of work. If we were inspecting fence the horses would graze in the bridle with the reins dragging the ground and never step on their reins. Sometimes we'd leave them graze for hours while we worked and never have one run off. They weren't broken down doddering wrecks, either."

Kentucky, the land of beautiful gaited saddle horses, is now one of the greatest boosters of the Walking Horse. Many Kentucky farmers keep a Walking Horse to help with the farm work.

Douglas Davis, one of the country's better known saddle horse judges, says, "What's tobacco farming without Walking Horses? Couldn't farm without one." This sentiment is echoed by John Marr, a licensed judge in the Tennessee Walking Horse Breeders Association and owner of several fine Walking Horses. When he isn't showing his horses as polished performers before crowds of horse fans, he has them back on his farm working in harness. They do a variety of jobs from plowing to manure spreading. "Muscles 'em up," Marr says. "Improves

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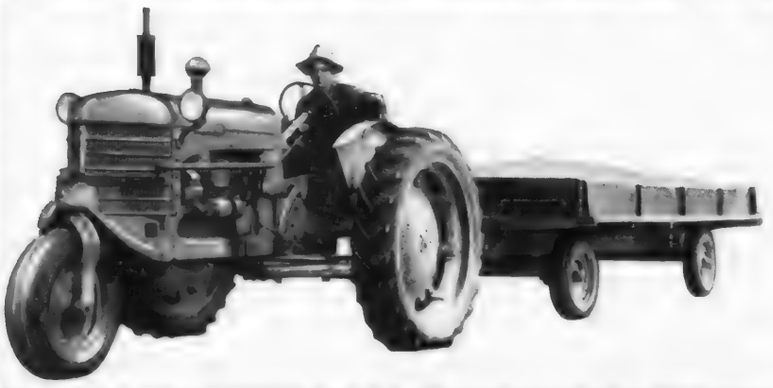

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The recent demand for Walking Horses has placed them in a price range well toward the top in the horse market. The buyer who can take his truck or trailer into the heart of the Walking Horse country around Lewisburg, Tennessee, may be able to purchase a good unregistered animal for $150. Anything above that figure, even up to and including $50,000, shouldn't surprise him, for among the breeders of top-flight Walking Horses big money in five figures changes hands frequently. One champion "Merry Go Boy," a five year old stallion, recently sold for $55,000.

The number of Walking Horse breeders is increasing. Chances are that unregistered Walking Horses can, in the near future, be bought throughout the country for $150 to $200.

In 1935 Walking Horse fans banned together and formed the Tennessee Walking Horse Association, which has headquarters at Lewisburg, Tennessee.

If the farmer wants to own a Walking Horse for the pleasure the animal will give him on his own farm, or the work he can do, there is little reason to insist on a pedigreed, registered animal. If he wants to show the horse, registration is almost a necessity. If he owns good registered stock he can figure on selling a yearling colt from each mare once a year for prices ranging from $500 and up, which may help him break even on expenses.

With Walking Horses it is the gait that counts. "He who rides a Walking Horse," say the Walking Horse fans, "doesn't have to eat his supper off the mantle."

THE AUTHOR

PAUL DeLOTT came out of the Navy at the end of the Second World War convinced that he should be able to make a living working with horses. To DeLott there could be no better life. He is a specialist in preparing advertising copy for horsemen. His list of current jobs makes him a Jack of everything in the horse world, and includes writing regular columns in several horse magazines, announcing at horse shows, acting as a Recognized Judge of the American Saddle Horse Association, raising and showing horses, and managing his farm which is populated with a cosmopolitan collection of horses, dogs, game chickens, cattle and other livestock.

TERRACES TAME THE RUNOFF (Continued from page 39)

It is important, too, that the first terraces have ridges that are high enough. "You think sometimes you have them high enough," Anson says, "then a heavy rain comes and you find you haven't."

Terraces are generally constructed with a drop in elevation of three to five inches for every 100 feet of length to insure proper drainage. When these factors have all been taken into consideration and a double check taken on the computations to make sure the lines of stakes around the slopes are in the right places, the farmer is ready to move in with his tractor and plow and start the actual moving of soil. If vegetation is heavy on the field he will save himself trouble by first mowing and raking the strips where the terraces will come.

"After you've built a few terraces," Anson points out, "you get the idea, and it becomes pretty simple." On his first terrace, however, he had to study the terracing directions put out by the Soil Conservation Service. He learned that it required about 35 rounds with his two bottom plow to complete a good broad-based, channel-type terrace. He learned too that there is a proper place to start each round so the soil is eventually moved onto the ridge. The round by round method of building a terrace is shown in the illustration on page 39.

The first furrow is thrown down-hill on a line five feet below the stakes. On the return trip the furrow is thrown up-hill 10 feet below the first furrow. It is in plowing these first two furrows that care must be taken to keep the interval accurate. When the terrace is finished, the ridge will be along the line formed by the stakes.

The steeper the slope the harder it is to move the soil up-hill. On slopes of six to 12 per cent, the one way method of terrace construction can be used.

The terrace may not be finished when the plowing is done. When the original line was laid out it had sharp turns where the contour lines crossed low spots. These sharp corners were straightened out before the terraces were made, because sharp turns are difficult for machinery to manipulate. Wherever the line was straightened to make a more gentle curve, there will be a low spot in the ridge. The low spots must be built up to keep the concentration of water behind them from over-topping the terrace. This job can be done with a slip scraper. Some farmers remove the teeth from their manure loader and use the shovel to move soil.

Terraced fields can be cultivated the same as they were before the terracing was completed. There need be no change in farming operations, providing the field is worked on the contour.

Newly built terraces should be fertilized and seeded to cover crops as soon as they are built.

Terracing can be done in any season of the year. Autumn is a good season for terracing if the soil holds enough moisture to allow the machinery to work efficiently and the tractor can move at a high speed. A good time to terrace is when plowing the field for seed bed preparation.

Under proper handling terraces will last indefinitely. Terraced land should be plowed on the contour following the general terrace pattern. If the plow and cultivator go over the terrace ridge, rainwater will soon follow.

The slope of the terrace walls can be

altered season by season by plowing to keep the ridge high and the slopes gentle. The dead furrow should be plowed in the bottom of the channel, and between terraces as many of the furrows as possible should be thrown up-hill to offset the natural down-hill movement of the soil.

The width of the strip of land separating two terraces may vary from one side of the field to the other, depending on changes in the steepness of slope. Here the plowman has to adjust the length of his crop rows and he will usually end with point rows, which are difficult for modern machinery to manipulate. Point row patches can be planted to beans or some other close growing crop that doesn't upset the rotation and needs no inter-row tillage.

"On land suitable for terracing," says Shorty Meritt, Work Unit Conservationist of Anson's Soil Conservation District, "farmers don't generally have to worry about strip cropping. Most fields, after they are terraced, can be worked as a unit." Some farmers, however, prefer to add the protection of strip cropping to the precaution of terracing. When a terraced field is strip cropped the strips should meet midway between the terraces, rather than on the ridges. This keeps cultivating uniform over the entire terrace and helps keep the ridge built up.

All of these soil saving practices require more time and care than farming with straight rows. In 1948, however, there was enough increase in income on the farms that have been treated by the Soil Conservation Service to return to the government an additional 70 million dollars in income taxes; enough to make the Soil Conservation Service turn a profit for the year. Farmers who have worked terraced land say, "While it may take longer to work terraced fields, the increase in yields is enough that it takes less time to produce a bushel of corn."

Newly built terraces should get regular inspections several times during the first year they are in use. The ridges will settle and low spots behind them will fill with silt. This is especially true where the terraces cross a gulley or depression, and when silt backs up behind terraces it must be cleaned out to keep water from overtopping the ridge.

With his own machinery and the guidance of the Soil Conservation Service, nearly any farmer can afford to terrace the fields that need it. The Soil Conservation Service points out that the cost of terracing a field is about the same as the cost of plowing that field one extra time. Records show that the cost of terracing with heavy equipment is about $150 a mile. This figure varies with the condition of the soil. Midwest farmers are able to construct from 1600 to 2400 feet of terrace in a day with a tractor and a two-bottom plow, and their cost can be figured on the basis of labor and fuel used. With the single disc terracing attachments for

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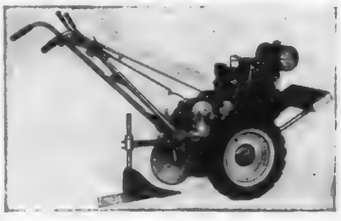
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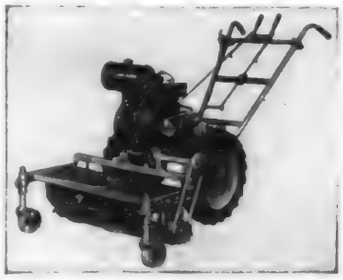
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tractors, it is possible to build a mile of terrace a day. Anson figures that bringing his field back into production costs $25 an acre. This includes the costs of terraces, fertilizer, lime and seed for cover crops.

Farmers who want to terrace should contact their local Soil Conservation Service representative, or their county agent. To get the help of the Soil Conservation Service on terracing, or any other soil saving practice, the farmer agrees to start farming conservation-wise, which means a complete farm plan including the best rotations, proper use of legumes, and adequate use of lime and fertilizer, all of which he figures out with his Soil Conservation Service representative. In those counties where there is no Soil Conservation District, the county agents are supervising the building of terraces.

Terracing alone is no guarantee of saving the land. Terraces won't do the whole job any more than a stool will stand on one leg. But, hill farmers need not shy away from a complete farm plan along conservation lines. The thousands of farmers turning to these aids every year are the strongest advocates of soil conservation. The reasons are plain. They are making more money than they were by plowing up and down-hill.

Two men with measuring stick guide tractor

Machinery owners who do custom work would rather work a field that has never been terraced. "No matter what they say," the custom workers point out, "it's harder to work terraced fields and more wearing on combines, side delivery rakes, and mowing machines." In many cases, however, the farmer has only one wise choice. He either terraces his fields or his yields drop.

Farmers' feelings about terraces have changed since the day one farmer saw his first terraced field and said, "Guess I'd as soon have my ditches run up and down-hill." There is more to terracing than the way the ditches run. Farmers in every state of the Union have learned, like Anson, that erosion control increases production.

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DO HOGS NEED MILK?

(Continued from page 71)

or corn will be the same, figuring that 100 pounds of skim-milk equals a half bushel of corn. Hogs on skim-milk and grain should get as much milk as they will drink twice daily. If they don't get enough water they may drink more milk than they can make good use of.

Skim-milk and buttermilk are now being dried by commercial processors and placed on the market in powder form. These dried products are good milk feeds, but they are often too expensive and are poor investments in view of the amount of pork a dollar's worth of dried milk will produce, for the more processing a product must have before it reaches the consumer, the higher its cost. As an exception dried milk feeds will pay for themselves when fed to very young pigs from six to ten weeks old. A little more expense is justified to give young pigs a good start.

One pound of either dried buttermilk or dried skim-milk is equal to about ten pounds of the original liquid. Dried skim-milk contains about 31 per cent digestible protein. The dried forms are prepared for feeding by mixing one pound with nine pounds of water. When this reconstituted skim or buttermilk is fed in the same proportions as the regular form the results are about the same.

Dried skim-milk retails for about $10 per 100 as compared with about $6.50 for the same feed value in skim-milk that is not condensed. This points up the wis-

dom of one hog man's comment, "Don't buy dried skim-milk if you can get fluid milk. The hogs will condense it."

Condensed Buttermilk

It was about 35 years ago that a creamery owner decided that a potential profit was going down the ditch behind his plant.

He had an idea. Why not remove some of the water from the buttermilk, and sell it to farmers for feed. Today there are dozens of plants scattered across the country that condense buttermilk and sell it to hog farmers. Generally, these plants are part of a creamery. The buttermilk is run from the churns into huge vats where it is heated until enough water is driven off to bring the total solids in the condensed buttermilk to about 27 per cent and its total weight is about one-third what it originally was. Some processors add extra materials to increase the feed value. A list of the ingredients in some fortified condensed buttermilk reads like the jackpot prize on a radio quiz show. One commercial brand prepared for sows contains whey solids, buttermilk solids, soya bean flour, vitamins A, D, E, and parts of the vitamin B complex, wheat germ meal, milk minerals, pyrodoxine choline, niacin and pantothenic acid. The hogs get their minerals from a separate mineral supplement.

Condensed buttermilk, a paste-like feed, is sold in barrels containing four to five hundred pounds, as well as in 100-pound and 50-pound drums. Condensed buttermilk sells for prices ranging up to $7 a hundred depending on what it contains. Generally it requires larger amounts of plain condensed buttermilk than of fortified brands to get equal results.

A hog born on the Conner Prairie Farms at Noblesville, Indiana, is guaranteed a meal of milk every day until trucked off to keep his date with a show case. Tillman Bubenzer, manager of Conner Prairie Farms, says, "We have used semi-solid buttermilk for three years, and I am of the opinion that a milk product, handled on an efficient basis and mixed with home-grown grains and supplement is the best ration obtainable. In 1948 our best Minnesota No. 1 litter of nine pigs averaged 94.44 pounds in 99 days at a feed cost of 13 cents per pound of pork produced and a rate of gain of 1.47 pounds per pig per day." Bubenzer is running a series of litter tests to determine the rate of gain and cost of growing a pound of pork.

Whey

Whey is a by-product of the cheese industry. Unlike the other milk feeds, it contains but little protein. Much of the protein is taken out when cheese is manufactured. Generally, whey is worth about one-half the value of skim-milk for hog feed. Whey as well as other milk products should be pasteurized before it is brought to the farm. Soured whey is as valuable

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as sweet whey if the containers are clean. When stored in filthy tanks or barrels it is a good breeding place for harmful bacteria. Some experiments have shown good gains on whey and corn, but when feeding whey a protein supplement should also be fed free-choice to compensate for the protein definciency that both whey and corn have. Until pigs weigh 125 pounds they can make good use of all the whey they'll eat. Above that weight the amount of whey fed should be cut down to avoid the chances of getting paunchy, thin-bellied hogs. Condensed whey retails for about $6

Dried whey can also be purchased. It retails for $6 to $9 a hundred.

To get the most good from milk feeds hogs should get no more of them than they require to supply their daily needs. The extra milk won't do them any damage but feeding it in excess brings up the cost of producing a pound of pork. If you thumb through your copy of Morrison's "Feeds and Feeding" you'll learn that pigs weighing 50 to 100 pounds should get 2.5 to three pounds of milk to a pound of corn if they get no other protein supplement. When they reach weights of 100 to 150 they should be fed two to two and a half pounds of milk to a pound of corn. Between the weights of 150 to 200 pounds they should get a pound and a half to two pounds of milk to the pound of corn. If they are on good pasture the milk can be cut in half. The farmer who can feed milk in these amounts need add no other protein supplement to the diet of his growing hogs. They should always, however, have access to a mineral supplement. Pigs under 70 pounds make the best use of milk. Milk feeds are valuable at weaning time to help them make the transition from sows' milk to other feeds.

Consolidated

The most active experimentation on milk feeds being done in the country today is taking place on a 240-acre farm near Danville, Illinois. Here, on the farm owned by the Consolidated Products Company, nutritionists and animal husbandry men are trying to learn the best ways to feed milk to chickens, calves and hogs. Their aim is admittedly commercial, for they manufacture milk by-product feeds for sale in every part of the country. Their experimental program, however, has arousned the interest, and for the most part, respect of government experiment station workers.

They are now following a hog growing program that enables them to send market hogs out in five and one-half months weighing 200 pounds or better, both summer and winter, with a minimum of pasture. They consistently produce a pound of pork on three and a quarter pounds of feed. Their plan is that a 40 acre farm can produce 1,000 market hogs a year and even in this concentrated program suffer little damage from disease and parasites. One man can handle these animals except for the twice a year farrowing times when he must call in some help. They raise cross-bred hogs from good breeding stock. They stress the fact that hog raising is more than proper feeding. It is also attention to breeding, sanitation, farrowing, and market trends.

Every hog on this experimental farm gets semi-solid buttermilk daily. The condensed buttermilk manufactured by Consolidated is fortified with the needed vitamins, and various high quality protein supplements to make it 46 per cent solid.

The biggest bug that the government research men find in this commercialized, production-line fashion of hog growing is that under the plan pasture is considered rather unimportant. Experiment station workers almost universally stick to their guns on the pasture question. As one university swine expert summed it up, "We have no quarrel with such a method except raising hogs in confinement. We prefer pasture." He adds, "Our hogs easily make 200 pounds in six months and they get no condensed buttermilk." Most farmers, however, don't get these results consistently. Those that do are doing a good job. Another professor said, "I like the program where a lot of hogs must be raised on small acreage," but he points out that there's a lot of hog feed in an acre of legume pasture.

Near Indianapolis, Indiana, is the 300-acre farm of C. M. Gentry, who has built his entire hog program around the feeding of milk products. He places his faith and his feed dollars in semi-solid buttermilk, and says he hasn't a kick. Last year he sent one lot of 100 hogs to market weighing 215 to 225 pounds at six months of age. Of one lot of 223 weaned in 1949, he sent 222 to market. Before he started feeding buttermilk he had been losing 10 per cent on mortality from weaning to market. Gentry has kept complete records and conducted feeding experiments for his own amazement. In 1949 he was producing market hogs at a cost of between 11 and 12 dollars per 100 pound gain on a combination of shelled corn, 40 per cent supplement, hog mineral and condensed buttermilk. On corn alone his cost of production has been between 15 and 18 dollars a hundred weight. On the average, Gentry fed only about four and a quarter bushels of corn for every 100 his own amazement. In 1948 he was propounds gain when he also fed buttermilk. When hogs must rely on corn alone they usually get to market two to three months later than when fed supplements.

Milk feeds can generally be valuable parts of the hog ration, regardless of the size of the herd. Whether the farmer is feeding one hog or 100 he can get milk in quantities to fit his enterprise. In most cases a market hog can make economical use of milk until he leaves the farm to become a sausage in the big city.

ANGORA RABBITS

(Continued from page 75)

tion but obviously an animal that produces 14 ounces of wool a year, of which 11 ounces are top grade is a more valuable animal than the one that produces 15 or 16 ounces of which only three or four ounces are tops. Since there is a difference of several dollars a pound between the top and bottom grades, quality is as vital as quantity.

Before buying stock visit as many breeders as possible. Local rabbit associations will help you to locate them. Breeding stock is generally sold at about three months of age. The average price is usually about seven dollars for bucks and $10 for does, although it will vary in different parts of the country. If you buy older stock, from eight to 18 months the prices will run about $15 for bucks and $25 for does. Naturally there are higher priced rabbits that demand more because they have proved their worth as breeders or have won a collection of impressive ribbons at registered stock shows.

What To Look For

English Angoras should weigh a minimum of five and a half and a maximum of eight pounds, have blocky bodies, broad heads, dense and lively wool, and good furnishings. The furnishings are the fluffy tassels at the tip of the ear, the bangs, and wool on tail and feet. The French Angora is a larger animal with coarser wool, longer body and head and lighter furnishings.

A breeder who is expanding is more apt to have good stock than the one who is selling out. General cleanliness of both hutches and animals is usually an indication of healthy stock. Think twice before purchasing stock from a rabbitry where a large number of animals have faces soiled by discharging eyes and noses.

It is wise to purchase foundation stock in your own community. Many reliable breeders fill orders by mail, but there is always an element of risk involved in buying from unseen sources. Despite the efforts of the industry there are still the few who buy culls and resell them with fancy fake pedigrees.

One of our first Angoras was Philene, a bred doe purchased by mail from the Midwest. Day after day rolled by without her arrival. I cornered the express agent in his office five days before the doe was due to kindle and told him that she was about to become a mother. Luckily he belonged to that group of men to whom motherhood is sacred. In an hour he had located her in a transfer office in New York.

Philene's babies arrived on schedule. It was the first litter for both of us, and she discharged her duties with considerably more intelligence than I did mine. I violated all the rules in the book. It seemed unnecessary to waste all the wool she had on her on arrival. It was spring, and the weather balmy, so I removed most of it,

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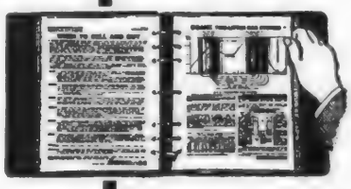

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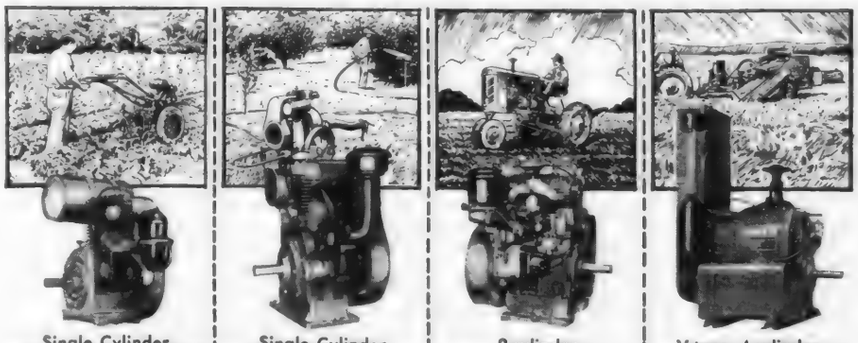

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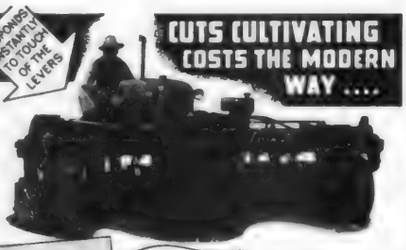

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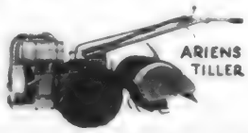

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leaving her practically nothing with which to line her nest. Two days later the thermometer plummeted to six above, and belatedly I decided she needed more nesting material. Lifting the nest box out into the cold and brilliant sunlight I was stunned to discover my tardiness. The stork had arrived and left five mouse-size, blind and naked babies. Some way they survived, and became great-grandmothers.

Angoras are first bred at eight to 12 months. If the animal has outstanding good points, including type, temperament, quality, and quantity of wool, she is taken to the buck's pen for breeding. If the buck is put in the doe's pen she may try to kill him. Thirty-one days later, if all has gone well, her nest contains half a dozen baby rabbits. The doe can be rebred three months after she kindles a litter for a possible four litters a year. Few breeders, however, push their breeders this hard, preferring to have them drop two to three litters a year, and keep their does in production longer. Doe rabbits can usually be bred anytime they are not pregnant. They have no sharply defined period of heat.

Motherhood

Does about to kindle are provided with a nest box—usually a standard nail keg with air holes bored at the top of the back, and a four and a half inch board nailed across the front. The board tips the keg slightly, helps to keep the young rabbits at the back of the nest, prevents it from rolling, and scrapes off any babies that may cling to the mother as she leaves the nest. The keg is filled with clean straw, through which the doe burrows to make her nest, lining it deeply with her own wool. The babies are dropped into the nest and covered with another layer of wool, the most luxuriously cradled of all new-born infants.

In the morning the doe is given a bowl of warm milk and the new litter entered by letter on the record of both sire and dam. After recording the new litter our care of the infants is ended for three days, during which time the nest is not disturbed in any way. Curiosity and eagerness tempts the new breeder to premature explorations, but meddling with a rabbit that has just become a mother often causes her to abandon her family. At the end of the three day period an examination is made, and if the litter is too large part of the babies are given to a foster mother. Six is enough for the average doe. The doe's feed is increased, and milk and extra greens included in her diet, but no further attention is needed by the infants until they begin to scamper about the hutch. From then on the straw in the nest is changed once or twice weekly and the grain and hay allowance increased regularly until weaning time at eight weeks. At the end of eight weeks, mother moves out of the nursery, gets her wool clipped, and settles down to freedom from domestic responsibilities.

The babies come into the workroom, and have their identifying number permanently tatooed in their left ear, odd numbers for males, even for females. Their names, numbers, parents and birthdate are entered in the record, a blanket pedigree filled out for the litter, and their baby wool clipped and weighed. Unless sold the litter remains together another two months, when each one gets an individual pen.

How Do You Identify A Good Wooler

By five months they have produced their first pay crop of wool, which is weighed and recorded by grade. This first mature plucking should defray the cost of their infant care and leave a substantial profit. The wool matured at eight or 11 months determines whether they become breeders, woolers or fryers. It is well not to be too hasty in lopping heads, for occasionally an animal is laggard in getting into production, and a medium good wooler at eight months may be outstanding at 15, although the trend can usually be determined earlier.

A good doe can average five young per litter. Most breeders are content with two breeding periods, spring and early fall, the most natural breeding seasons for domestic as well as wild rabbits. The productive life of a breeding doe begins at approximately one year and continues until she is six, or older, if she is bred consistently once or twice a year. Does with litters pull from one to three ounces of wool from their

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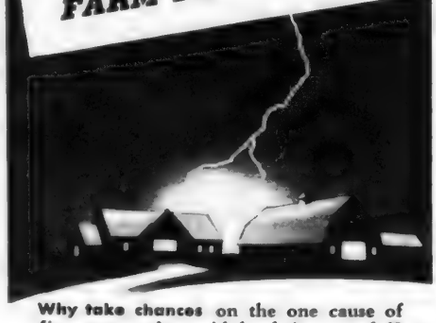

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SECURITY
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bodies for nest material. This is lost for commercial purposes, but since only high woolers should be used for breeding she should still average 14 ounces of wool, or better, annually.

A buck is productive for approximately the same period of time as a doe if he is kept working. Bucks are apt to become sterile after prolonged spells of inactivity, or if subjected to extensive periods of hot weather.

The Harvest

A good commercial wooler matures a full crop of three to five ounces of wool, or better, four times a year, and since Angora wool is produced by the animal essentially as insulation against heat or cold, the heaviest harvests will be those following summer or winter growth. An animal producing an average of less than 14 ounces of wool a year, with at least 85% in upper grades, is unprofitable, and should be culled for meat. The wool on even a low producer, however, is invariably more valuable clipped and graded, than left on the pelt, so an animal to be butchered is first clipped. Angora pelts have little commercial value.

The average doe produces a larger yield, and better quality wool, than the average buck. The most efficient herd contains about 10 does to one buck.

There are seven commercial grades of wool, grading being based on length of fiber, cleanliness, and condition.

Grade of Wool

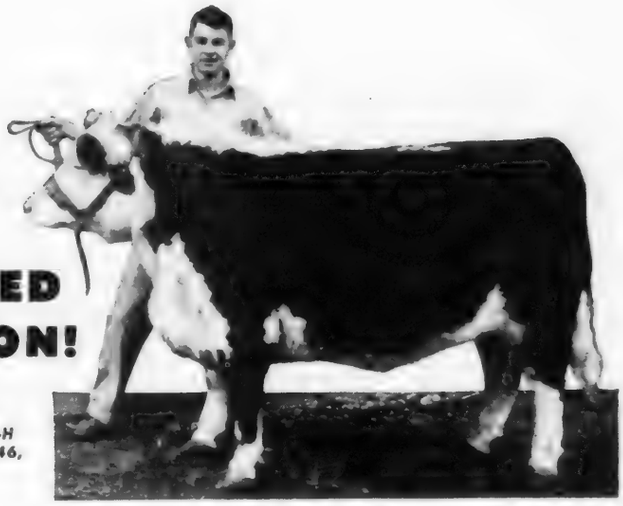
No. 1 Plucked 3" or longer, clean and free from mats.
No. 2 Plucked 2½-3" or longer, clean and free from mats.
No. 1 Clipped 2½-3" or longer.
No. 2 Clipped 1½-2½" or longer, clean and free from mats.
No. 3 Clipped Shorts, baby wool, and slightly matted wool, clean.
No. 4 Clean mats.
No. 5 Soiled wool.

At the time this article was written, prices ranged from about 40c per lb. for No. 5 up to about $8.00 per lb. for No. 1-P.

At present there is no premium or penalty for fiber quality.

The breeder can tell whether or not the wool is ready to pluck by testing it with the fingers to see if it pulls out easily. It is usually three inches long when the moult begins, but may be shorter. If there is loose wool starting to show up on the hutch floor the moult is started and plucking is slightly over-due. There is some difference of opinion among breeders as to whether or not plucking should be done according to calendar or the individual animal's condition. All the animals won't mature a crop of wool at the same time. Personally I believe that a breeder gets best results by working through his entire herd once a month. With a little experience he will be able to select immediately those animals that are ready for plucking.

Whether the animal is to be plucked or clipped, the initial process is the same. The wool is lightly brushed to straighten the



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fibers and loosen any foreign matter. Part it down the middle of the back. This is the only grooming a commercial Angora needs. Most animals will sit quietly on a table or on the operator's lap while the wool is removed from the back, shoulders and flanks. There are commercial clipping tables advertised in rabbit publications, at a reasonable price, but many breeders use homemade arrangements of swivel tables and straps. Clipping 40 rabbits is a day's work.

If the wool is to be plucked the operator holds the animal's skin taught with one hand, drawing the wool free with the other. The Angora should be moulting so the wool is loose and its removal causes no discomfort to the animal. Plucking stimulates wool growth. It is a fairly new process in this country, but more and more breeders are trying it.

Wool is graded as taken from the rabbit —the long staple, high quality wool first. When the back is clean, the rabbit is turned belly up, either on a special table where its legs can be secured, or on the operator's lap with the ears held firmly between the knees and the hind legs tied securely around his waist. The chest is then plucked in the same manner as the back, and the belly, tail and legs clipped, special care being taken to avoid injury to teats and genitals.

In clipping the back, one blade of the shears should lie parallel to the body of the animal, and a swath of wool cut down the middle of the back from tail to neck, and repeated until one side is clean. The animal is then turned around and the other side clipped. Chest and belly are handled as above.

A medium sized scissor or shear, not over 8" in length, with at least one sharp point for removing matted hair, is best for this purpose. A larger shear with such a comparatively small animal, would be unwieldly to use.

Rabbits have double skins, the outer one being extremely loose. When the wool is grasped, the soft outer skin pulls away from the rabbit's body, and unless care is exercised, it is easy to cut through a fold of skin, leaving an ugly circular wound. It is helpful for the novice to work against a light. The skin can then be easily identified and since there is no premium for wool with hide attached, both the rabbit and the breeder are happier if the shears are never closed on flesh.

For weighing the wool a set of feather scales or baby scales that weigh to the nearest sixteenth of a pound are ideal. After the wool is graded it should be packed in large tin cans to protect it from moths, and excess moisture or heat. It is shipped in paper bags according to grade. Several bags of different grades can be packed in one cardboard box.

Here is a partial list of markets that buy Angora wool:

Calif. Angora Wool Growers Inc.
PO Box 541
Hawthorne, Calif.

American Angora Rabbit Breeders Coop.
Palmer Lake, Colorado

American Angora Co.
Box 914
Malta, Mont.

Gilcrest Angora Co.
Dept. 61
East Haven 12, Conn.

Some of these are true co-operatives, some partially so and some independent commercial buyers. A letter to any of these buyers will probably bring a list of current prices and requirements.

Besides yarns for knitting, Angora wool is used, in increasing quantities, in blends with other wools for the manufacture of suitings and other material where fineness and warmth are required. Lower grades go into felts and quiltings.

Rabbit meat is another profitable source of income for the breeder. Since it costs as much to feed an animal producing eight ounces of wool as it does one producing 14 to 16 ounces, it is not sound economy to keep many free boarders. Domestic rabbit meat is all white, similar in appearance and flavor to breast of turkey.

Handspinning is another fascinating natural side-line of Angora breeding. Many old spinning wheels that have been gathering attic dust more than a century have been brought into the light, conditioned and put to work again.

Most herbivorous domestic animals produce a manure that is valuable as a fertilizer, and rabbits are no exception. If protected from moisture it remains odorless. If carefully handled, the manure from one rabbit can easily add an additional dollar a year to its profits. Sold by the load or the bushel as raked, or dried, sifted and sacked, it finds a ready and profitable market.

Not all is brightness on the Angora front. Wool is being shipped in from Europe and purchased here at about eight dollars a pound. Most American Angora breeders feel that this is just about what it costs them to produce a pound of wool, which leaves no profit. There are rumors now that foreign imports will die off in the near future. Whether or not these rumors prove true remains to be seen. Other than this economic angle, Angora breeding has few drawbacks. Angoras, like any other stock, will tie the breeder down to the home place. There is a lot of detail work to do and the person who likes to avoid records, and care in breeding and feeding chores, should also avoid rabbits.

THE AUTHOR

M. PRISCILLA CARLSON keeps a large collection of Angora rabbits busy supplying Angora wool for her spinning wheel. She spends one day a week in the Huntington, Long Island Handicraft House in which she is a partner. At the Handicraft House she spins Angora wool into yarn for baby clothing. She also keeps some rabbits there, and the public can watch her clip her rabbits and spin their hair.

HOW TO FEED DAIRY CALVES

(Continued from page 55)

them digestive troubles. They shouldn't be turned out to eat until after they are six months old. After they are one month old they can be turned out for exercise on warm days.

Another feed that nature apparently didn't intend for the innards of very young calves is silage. It can be fed a pound or two a day after the calves are three months old. From four to six months of age, calves can handle about four pounds of silage a day.

Bull calves being raised for herd breeding should get the same care and feeding that heifer calves get.

How To Feed Veal Calves

Bull calves that are to be vealed should be kept on the cow until they are six or eight weeks old when they should be heavy enough to market. They will gain faster if left on their mothers or with a nurse cow until marketed. Ten pounds of milk produces one pound of veal. A calf that is going to be profitable for vealing should weigh about 100 pounds at birth, and should have gained another 40 to 60 pounds by the time he is six to eight weeks old. Many stock yards dock farmers on calves weighing less than 100 pounds. If a veal calf gains 50 pounds he has used roughly 500 pounds of milk in the process. A farmer can tell whether or not this is profitable by comparing the current prices of veal and whole milk. With the present high prices of milk many farmers say they can't afford to feed calves milk and then sell them for veal. They often solve the problem by destroying the calf a day or two after it is born.

Milk Substitutes

Within the past few years commercial calf feeds that can replace part of the milk needs of the calf have been showing up on the market. These are usually mixtures of milk by-products, fortified with various vitamins and mineral feeds. The plan with most milk substitutes is to wean the calf from its mother's milk after a week or ten days and gradually get it started on the ersatz feed. Agricultural college and experiment station men haven't all made up their minds on the value of these products. Some endorse certain brands, while others condemn them all. One dairyman said, "If it is nutritious enough to replace milk it will be almost as expensive as feeding milk." This dairyman's opinion, however, was a generalization. These various milk substitutes deserve a second look from the dairyman. He can easily determine whether or not he can afford to feed them and save the milk for market. The manufacturer of one milk substitute recommends that his product replace all but 18 pounds of the total cow's milk normally fed to a calf. Assuming that a calf would normally get 350 pounds of milk, the farmer will, by

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feeding this commercial milk substitute, save 332 pounds of milk. At current prices the 332 pounds of milk would net him about $16.80. The milk substitute required to replace it would cost $6.83, which would leave him a profit of $9.77, assuming that the calf thrives as well on the substitute. The situation changes with fluctuations in the milk market, and with the contents of the milk substitute feeds, but by applying the same formula to each feed the farmer can make his own decision at any time.

As some ancient said in a moment of wisdom, "It's a long road that has no turning." So it is with calf feeding. All the points outlined so far are results of years of feeding experiments by learned men. Now, mingled with these time-tested ideas, there comes word that something entirely new in calf feeding is growing out of experiments at the Ohio Agricultural Experiment Station.

Two dairy research men at the Ohio Station, W. D. Pounden and J. W. Hibbs, are hot on the trail of a plan that can change the whole program. Their experimentation during the past two years indicates that the best way to feed calves may be to give them no grain at all, just hay and milk. Their experimental calves fed just hay and milk were practically free of scours. When calf meal was included in their diet 50 per cent of the calves showed some sign of scours. The young stock that they've started on milk and hay alone, plus a second hand cud, appear to be strong, vigorous animals.

One problem is that calves aren't capable of digesting hay at very early ages to any extent. Pounden and Hibbs got around this one nicely. The reason young calves can't digest hay is that bacteria which break hay down have not had a chance to become established in the rumen within the few weeks the calf has been alive. The two Ohio scientists introduce the bacteria by making the calves swallow part of the cud of an adult cow. Apparently the bacteria introduced in this way go right to work and the calf becomes a hay burner without waiting for nature's slower course, providing there isn't a lot of grain in the rumen.

Pounden and Hibbs aren't making any guesses on the probable benefits that this practice might bring out. If the whole thing works out, however, it isn't out of line to have visions of healthier calves because of fewer cases of scours, and cheaper calves by cutting out the grain that calves are normally fed.

Mixed with the milk, hay and grain in a calf feeding program is a liberal amount of common sense. The good dairyman takes what he knows about his animals, what he can learn from the scientists, and fits them to his needs. That's what makes him a good dairyman.

DISTILLERS FEEDS

(Continued from page 69)

produce a solid, prime carcass.

While the grains can be stored in bulk in elevators and in the ordinary farm storage space, the solubles will cake if exposed to moisture. Once caked, they must be reground for feeding. Waterproof bags are used to prevent caking.

Brewers' Feeds?

There has been some confusion among feed dealers and farmers regarding the relative merits of distillers grains and solubles and the stock feed produced by breweries. While the two are the result of somewhat similar processes, there is a wide difference in content and feed value. Both have a place in the stock ration picture. The scope of this article does not include a discussion of the brewers' products, nor the animal feeds turned out by distilleries making alcohol from molasses and other non-grain sources.

Experiments show that distillers feeds can be used successfully as the protein supplement in cattle feeds. At the Kentucky Experiment Station a ration containing light grains and corn-and-cobmeal fed to cattle on blue grass pasture and good clover hay required less grain per pound gain and was more economical than rations supplemented with gluten meal or cottonseed meal, alone and with bran. In later tests distillers grains were equal to cottonseed meal in fattening steers on like rations of corn, hay, and silage.

Down in Kentucky, farmers feed a lot of dried grains and solubles and each year send their finished cattle to the Bourbon Beef Show. Those who show cattle must agree to feed not less than one pound of solubles or one and one-fourth pounds distillers dried grains a day to each animal. Animals shown at the Bourbon Beef Show are not excelled anywhere. The 1,323 animals entered in the 1948 show sold for an average of $29.98 to packers scattered throughout the Midwest. This was $2 to $3 above the market. Dressing percentages and carcass grades as reported by ten of the purchasers were as follows: The average dressing percentage was 61.05 per cent; the top was 65.33; the low was 57.96; there were 12 prime carcasses, 334 choice, 334 good, and 24 commercial.

Distillers dried grains, dark grains and dried solubles, are all recommended for fattening beef cattle. At the Nebraska station, for a unit of gain 100 pounds of dried grains replaced 71 pounds of soybean oil meal and 71 pounds of ground shelled corn. At Iowa 100 pounds of gain was made on two-year-old steers by feeding 90 pounds of dried grains, 1,448 pounds of corn silage, 368 pounds of corn, 46 pounds of oats, 62 pounds of alfalfa, 64 pounds of salt and three pounds of a mineral mixture. In this test the daily average gain was 2.21 pounds.

In these tests on cattle, and others with corn and cobmeal, straw and hay, station directors reported economical high gains were made.

In general, the feeding of distillers dried grains and solubles to cattle is handled like any other protein supplement. However, it has been found that cattle relish these supplements better when mixed in the grain ration rather than fed separately. Like any other new feed, it should be introduced gradually into the ration until the cattle become accustomed to the taste. A handful per head a day for two or three days, mixed with the grain or sprinkled over hay, is a good way to start, with increases thereafter of about one-fourth pound a day until the desired amount is in the ration.

Dan Cox, manager of Sutherland Farms, Prospect, Kentucky, says, "I feed silage with solubles to beef cattle and weaned calves and I believe they do better on this than on any other feed I have ever used. I sprinkle three-fourths pound of the solubles per head per day over the silage."

Wallace Campbell, manager of the Max Walton Farms, Mansfield, Ohio, used the grains and solubles when fitting Max Walton's Shorthorns for show. "I find the light grains best for dairy cattle in production and prefer the solubles for beef cattle. I mix one part light grains with two parts home-grown grain to get a 16 per cent dairy feed. I find this the best I have tried in a lifetime of handling dairy cows. With this I give the cows all the hay they will eat." He says the light grains and solubles add a little extra to finish when fed before showing and he believes the unknown factor in the solubles helps conception in cows and hogs.

The following is a recommended formula for fattening steers: ear corn ground, 400; molasses, 200; oat mill feed, 200; fine ground screenings, 400; distillers dried grains or distillers dried grains with solubles, 300; alfalfa meal, 17 per cent dehydrated, 150; linseed meal, 100; cottonseed meal, 200; iodized salt, 20; ground limestone, 30; bone meal, steamed, 25; cobalt sulfate, 2 gm.; total 2,025 pounds. This produced a ration of 14 per cent protein, 3 per cent fat, and 13 per cent fiber.

Dairy Cows

Distillers dried grains and solubles are increasing in popularity as a supplement for feeding dairy cows, particularly for those on test.

At Ohio State University the feeding value of distillers dried solubles was determined in a double reversal feeding trial with ten pairs of cows. Solubles as the main source of protein in dairy cattle ration were found satisfactory under practical conditions.

Although distillers feeds exert a healthy and stimulating influence upon milk production, the exact reasons are unknown. Apparently there is one or more factors as yet unidentified which stimulate milk production and may be associated with the solubles portion of the dried grains. In certain regions it is difficult to maintain the amount of fat desired in dairy rations. The inclusion of distillers grains which are a good source of this nutrient helps solve this formulation problem. The solubles have a high concentration of vitamin B complex and choline, which aids in the assimilation of phosphorus.

E. R. Kuck, New Knoxville, Ohio, dairyman, who mixes his own feed, says, "I have been feeding solubles to my cows since distillers feeds first came on the market. The choline helps the cow to assimilate phosphorus, which she vitally needs, from home-grown hays. I have

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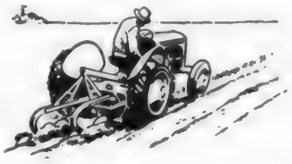

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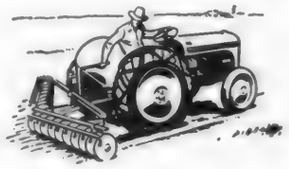

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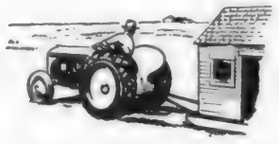

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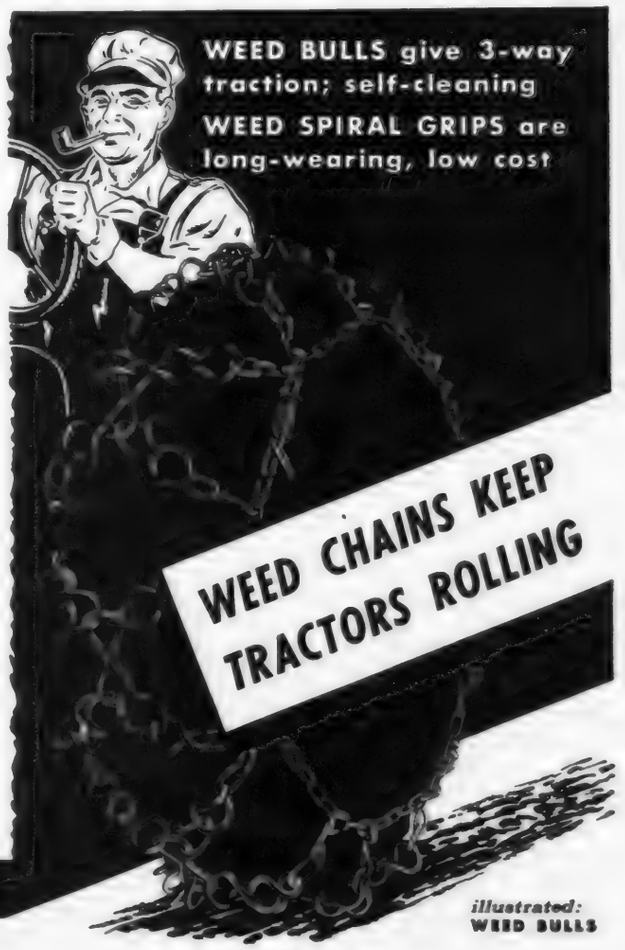
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found that I get the best results when I use about four per cent solubles in my milking cow ration."

Much emphasis has been placed in recent years on dry rations for raising calves. Until the rumen develops it is necessary to supply all the essential nutrients in the feed. At Pennsylvania State College distillers solubles and dark grains satisfactorily replaced linseed oil meal, dried brewers' yeast, and dried whey in the ration of dairy calves, and resulted in more economical gains in the calves.

The following is a recommended formula for a 16 per cent protein dairy feed; ground oats, 370; molasses, 100; hominy feed and corn meal, 380; wheat bran, 360; distillers dried grains, 260; linseed oil meal, 100; coconut oil meal, 300; soybean oil meal, 100; iodized salt, 10; ground limestone, 5; bone meal, steamed, 15; cobalt sulfate, 2 gm.; total 2,000 pounds. This is a 16 per cent protein, 4.5 per cent fat, and 11 per cent fiber formula.

The following is recommended as a milk replacement mixture for calves: yellow ground corn, 420; crushed oats, 420; wheat bran middlings, 280; distillers grain solubles, 560; soybean oil meal, 280; iodized salt, 17; steamed bone meal, 34; irradiated yeast ½; total 2011½ pounds. This produces a 27.5 per cent protein, 4.5 per cent fat, and 5.5. per cent fiber ration.

Hogs

At the University of Illinois distillers solubles were used as a supplement in creep rations for suckling pigs and lactation, gestation, and growing-fattening rations for swine in dry lot. Addition of solubles to a creep ration and to a post-weaning ration, composed of corn, middlings, soybean meal, tankage, fish meal, minerals, and vitamin A and D oil, improved the growth rate and decreased death losses during the post-weaning period as compared to the unfortified rations. Addition of solubles to a sow's lactation ration containing corn, tankage, soybean meal, alfalfa meal and mineral, produced better development of the pigs placed on an inadequate ration after weaning. A higher percentage of survival, smoother, sleeker hair coats and skins, and more normal development of the feet and legs were obtained. The Illinois people believe that the reason for this is that distillers solubles increased the amount of the water-soluble vitamins in the sow's milk, and in turn these vitamins were stored in the bodies of the suckling pigs.

At the Ohio Experiment Station dry lot feeding of pigs on a ration composed of corn, soybean meal, alfalfa, irradiated yeast and minerals was found nutritionally inadequate. When distillers dried solubles were included in the ration, the pigs grew more normally, remained healthier and made more rapid gains

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At Purdue University distillers solubles effectively supplemented dry lot growing-fattening swine rations containing either a small quantity of animal protein or only protein derived from plant sources. Results of these tests were comparable to those obtained from feeding the trio mixture. At the Wisconsin Experiment Station distillers solubles were found to have a favorable supplementary effect in dry lot rations for growing-fattening swine.

The following is a recommended pig starter: ground yellow corn, 900; wheat flour middlings, 200; distillers solubles, 125; alfalfa meal 17 per cent dehydrated, 100; soybean oil meal, 300; tankage, 200; fish meal, 125; iodized salt, 10; ground limestone, 20; steamed bone meal, 20; total, 2,000 pounds. This is a 28 per cent protein, 4.5 fat, and 6.5 fiber formula.

Here is a recommended sow supplement: distillers solubles, 400; alfalfa meal 17 per cent dehydrated, 400; soybean oil meal, 500; meat and bone scraps, 300; tankage, 200; fish meal, 104; iodized salt, 30; ground limestone, 60; manganese sulfate, ½; vitamin A and D oil (400 D-2,000 A), 12; total, 2,006 pounds. This is a 35 per cent protein, 4.5 fat, and 8.5 fiber formula.

The distillers feed most suitable for use by poultry is dried solubles because it is the most potent in the water-soluble vitamins and the lowest in fiber.

In starting and growing poultry rations the Massachusetts Station found solubles to be both good and economical sources of vitamins B and G. At Purdue University satisfactory growth and feed efficiency were obtained when solubles were used with a small amount of animal protein in a growing ration.

The Massachusetts Station obtained satisfactory egg production, egg size and quality when dark grains or solubles replaced skim-milk and fish meal in the New England Conference laying ration. In Oregon solubles in conjunction with soybean oil meal and small amounts of meat and fish products were compared with standard practical rations and found satisfactory as to egg production and mortality. The solubles are substituted regularly for dried skim-milk with no noticeable effect on growth.

The following is a recommended egg mash with grain: ground yellow corn, 450; ground oats, 200; wheat bran, 200; wheat middlings, 400; distillers solubles, 100; alfalfa meal 17 per cent dehydrated, 100; soybean oil meal, 350; meal scraps, 50; fish meal, 50; iodized salt, 20; ground limestone, 60; steamed bone meal, 40; vitamin A and D oil (400 D-2,000 A), 8; total, 2,028 pounds. This is a 20 per cent protein, 4 per cent fat, and 7.5 per cent fiber formula.

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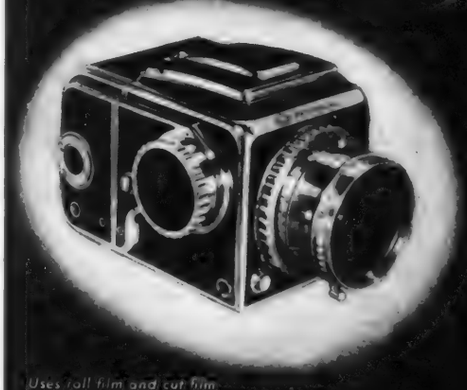

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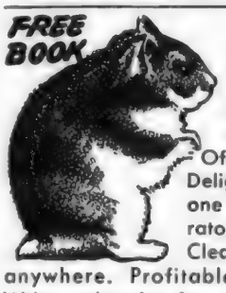

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It may cause such milk-borne diseases as Undulant Fever (Brucellosis) resulting from Bang's disease, Typhoid Fever, Scarlet Fever, etc. The only certain way to make milk safe is to pasteurize it.

WATERS CONLEY HOME PASTEURIZER

ADVERTISED IN AMERICAN MEDICAL ASSOCIATION PUBLICATIONS

Handy one-gallon size. Entirely automatic. Assures positive pasteurization. Operates on 110 AC current. Carries 90 day guarantee. $29.95 post paid. Order from ad.

WATERS CONLEY CO.
Dept. G
Rochester, Minn.

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HERE'S WHY
Livestock Need Trace Mineralized Salt

The more nutritionists learn about animal feeding, the more important do trace minerals become. They have discovered that trace minerals influence the whole enzyme, hormone, and vitamin activities of the body — the basic life functions.

But because of heavy cropping of land, erosion, and the greater results we expect of livestock, few animals get enough. This is true even in the most fertile parts of the country.

The safe way, the easy, effective economical way, to feed essential cobalt, iron, copper, manganese, and iodine is in Morton's Trace Mineralized Salt. It is like a low-cost insurance policy covering all your livestock — assurance of healthier, thriftier animals and greater profits.

In 1906 the average dairy herd improvement cow gave 215 pounds of butterfat a year. Today she produces 344 pounds. Because of this increased bodily activity there is greater need of trace minerals.

Erosion has dumped millions of tons of fertile topsoil into our rivers, lakes, and oceans . . . robbed us of precious minerals. A recent survey in Wisconsin, shows four out of five farms to be deficient.

Heavy cropping of land has consistently taken more minerals out of our soils. There is not enough to supply plant life adequately. Trace minerals must be fed directly to be sure livestock get enough.

The best way to feed trace minerals is Morton's Trace Mineralized Salt, fed *free choice*. Then each animal can take what it wants and needs. The cost is only a few cents additional per animal per year.

Morton's Free Choice Salt is the Logical Carrier for Trace Minerals . . . Cobalt . . . Iron . . . Copper . . . Manganese . . . Iodine

There is an interdependence between salt and trace minerals. They work better as a group than as individual elements. More-over, fed Free Choice, there is a regular, constant intake — never too much or too little.

MORTON'S
Free Choice **TRACE MINERALIZED SALT**

FARM BOOKS

(Continued from page 14)

when used as reference books. In looking up corn, for example, it is necessary to go to volume 1 to find history, botony and distribution. Volume 2 deals with varieties, soil needs, planting and cultivating the crop. The labor requirements, use of machinery, storage, marketing and diseases are treated in volume 3, and it is necessary to turn to volume 4 to find a discussion of breeding experiments and the production of hybrid corn. A general index for the four volumes would certainly have helped.

A second criticism of the set as a whole is that there is considerable repetition of material. This is probably unavoidable where a cross section of American agriculture is presented in each volume. But these criticisms are rather minor and should not over-shadow the advantages of presenting agriculture as an intigrated whole. For, after all, farming is a complex business made up of a number of interrelated projects which must be operated and managed as a whole. And the farmer must, at times, look on himself as a laborer, an efficiency expert, a manager and book keeper, and as a business man with money invested who expects a return. *Album of Historical Steam Traction Engines And Threshing Equipment* by Floyd Clymer $2.50

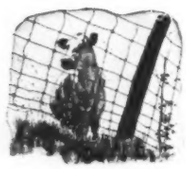
Readers who get a catch in their throats when looking at an ancient Sears-Roebuck catalogue; people who still have a tendency to argue the merits of the Stanley Steamer and who treasure the age-faded, brown photographs of the first thresher on the farm will enjoy this *Album*. The 160 page, paper bound book is an awkward jumble of line drawings, wood engravings and reprints of old advertisments, but, for one who likes machinery (and what American doesn't) or who has a strong feeling of nostalgia, it is hard to lay aside.

Clymer has gathered together the original advertising drawings and photographs of 105 makes of American and foreign steam engines and embellished the book with pages of advertising and editorial comment from the agricultural journals of the peroid. The reproductions of advertising pages carry ads for the steam traction engines and also the bargains of the peroid: giant front wheeled bikes, sewing machines for $11 to $17, free offers of "Bates' Rheumatic Foot Drafts".

Along with the steam tractors, Clymer includes a few illustrations and working drawings of the horse-tread machines that preceded steam. The book as a whole, manages to present a fine hodgepodge of steam engines and glimpses into the 19th century when advertising was free and easy and the mechanization of American farms was just getting under way.

The Farm Book Store

The Editors of the Farm Quarterly, after a careful selection of current agricultural books, recommend the following to our readers.



Livestock

Feeds and Feeding (21st ed.)—*by F. B. Morrison*.....$7.00
The authoritative book on livestock and poultry feeding.
Dairy Science—*by W. E. Petersen*.....$5.00
680 pages of the best modern dairying practices.
Sheep Science—*by W. G. Kammlade*.....$5.00
The breeds, care and feeding of sheep for wool and mutton production.
Beef Cattle—*by Roscoe R. Snapp*.....$5.00
A carefully revised edition of this excellent book on beef production.
Poultry Handbook—*by Rudolph Seiden*.....$6.00
An alphabetical reference book of poultry information.
Successful Poultry Management—*by M. A. Jull*.....$3.50
A practical book on poultry from brooding to marketing.
Pork Production—*by William W. Smith*.....$4.25
The standard text on the breeding, raising and marketing of hogs.
Swine Enterprises—*by Arthur L. Anderson*.....$2.80
A thorough study of swine raising for the beginner.
The ABC's of Beekeeping—*by A. I. Root*.....$3.75
The standard reference book on bees and honey production.

Soil and Crops

Soils and Fertilizers—*by Firman E. Bear*.....$3.75
An understandable book on the complex subject of fertility.
Using and Managing Soils—*by A. F. Gustafson*.....$2.80
Fertility, rotation, drainage, erosion, tillage are covered.
Elements of Soil Conservation—*by H. H. Bennett*.....$3.20
A discussion of erosion and exhaustion of soils, by an authority.
Production of Field Crops—*by Hutcheson, Wolf & Kipps*....$4.50
A new edition makes this the latest work on American field crops.
Vegetable Crops—*by Homer C. Thompson*.....$6.00
The science of producing and handling vegetable crops.
Weeds—*by W. C. Muenscher*.....$6.00
The identification and control of these soil bandits.

THE FARM BOOK STORE A
c/o The Farm Quarterly
22 E. 12th St.
Cincinnati 10, Ohio

I enclose (check, money order or cash) for the following books. Please send them to me immediately.

_____ (Title of book) _____ (Price)
_____ (Title of book) _____ (Price)
_____ (Title of book) _____ (Price)

Name_____
Address_____
City_____ State_____

THE BOOKS WILL BE SENT TO YOU POSTPAID.
Buyers living in Ohio should add 3% to price for sales tax.

Farm Management

Modern Farm Management—*by Andrew Boss & G. A. Pond*..$5.00
The principles and application of management to the farm.
Farming for Profit—*by H. R. Herndon*.....$3.75
A primer for those starting in agriculture.
Success on the Small Farm—*by Haydn S. Pearson*.....$2.50
Subject—how to net $3,000 a year on 10 to 12 acres.
The Farmer's Handbook—*by John M. White*.....$4.95
Easy reference book on crops, livestock, and farm problems.
Farm Mechanics—*by Cook, Scranton & McColly*.....$3.15
A needed reference book on the mechanized farm.
American Farming (4 vols.)—*by Boss, Wilson & Peterson*..$15.00
A review of this set may be found in the Farm Books column.
Album of Historical Steam Traction Engines—*by Clymer*....$2.50
A review of this book may be found in the Farm Books column.

We were too late with our pictures for this ad

We have been too busy turning out farm buildings—buildings that tie in with the **NEW AGRICULTURE**—that meet the building problems brought about by the **AGRICULTURAL REVOLUTION.**

Let's take a minute to consider the revolutionary changes that have occurred in a short space of time because of farm mechanization, hybrid hogs and corn, artificial insemination, cultural and fertilizing methods, grass farming, the field forage harvester and a host of other advances. Put yourself back in TIME to your grandfather's day. What do you see when you look at the old-time farm homestead? What is the dominant structure that dwarfs everything else? Of course, it's the barn—the huge, towering bank barn with stalls below and mammoth dome caverns above for hay, fodder and straw. A thing of pride, the lifetime ambition of every young farmer just starting out. But an anachronism today—Webster says "an anachronism is something that is incongruous in point of time with its surroundings".

So the beautiful big barn is a museum piece—an anachronism—a **WHITE ELEPHANT.** In spite of the sentiment attached to it, the nostalgic longing for the happy days of childhood when we played in its fragrant mows or enjoyed the warm cow aroma of the stables on cold winter days, the barn has no place in today's scheme of things. It is an expensive luxury, for any attempt to adapt it to today's requirements results only in a make-shift, more expensive method of doing things. Even the word "barn" is obsolete today except as a general term. It must be qualified if it is to have a definite meaning. Thus we say loafing barn, tie barn or tobacco barn and the building thus named bears little similarity to the old-fashioned barn.

Times have changed—conditions have changed. **MARTIN** has ridden the wave—in fact Martin buildings have been in the vanguard of the **AGRICULTURAL REVOLUTION.** As new farm practices have brought about the need for new farm structures, Martin has had these structures ready. Martin "Steel-Bilt" Farm Buildings fit the new agricultural era. They insure the maximum profit from the new methods—they soon pay for themselves—and—they are things of beauty—permanent, efficient buildings that harmonize with their surroundings. As we said at the start we didn't have time to prepare an ad of beautiful pictures of Martin Buildings.

Government Allocation of steel for corn and grain storage and the greater availability of materials has enabled us to get back into heavy production. For the past ten years we have been unable to fill more than a small part of the demand for Martin buildings. This year we hope to do better. Our plant has expanded to give us greater efficiency which with lower material costs has enabled us to drastically reduce our prices. In fact, Martin prices today are the lowest in history in terms of farm products.

Let us send you our folder on the building you may be considering. It will give you the description and pictures we couldn't get into this ad.

mail this coupon today

Martin Steel Products Corp.,
703 Longview Ave., Mansfield, Ohio.

Please rush me FREE literature on the buildings and methods checked below.

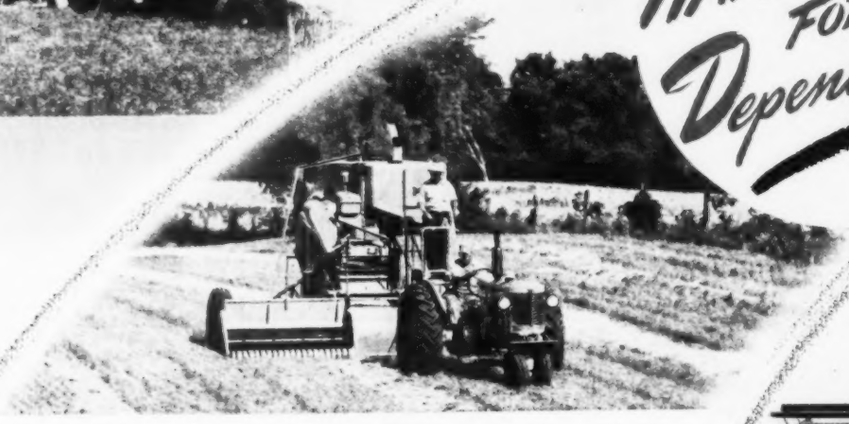
- ☐ MARTIN corn conditioning and storage method
- ☐ MARTIN haymaker method of storing and curing chopped hay
- ☐ MARTIN grain storage buildings
- ☐ MARTIN all metal barn
- ☐ MARTIN all metal silo
- ☐ MARTIN utility buildings
- ☐ Special buildings (Send specifications and requirements and we will make recommendations)

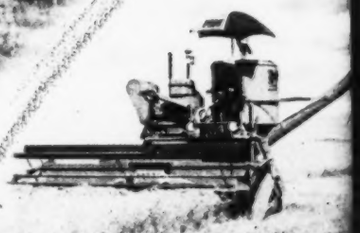
Name _____

Address _____

Town _____ State _____

THE HARVESTORS FOR Dependability



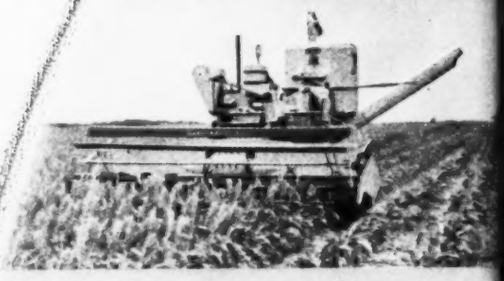


Leading Sellers...

SINCE THEY WERE FIRST MADE

On the trail of progress MM blazed in designing and building modern machinery for farmers everywhere, Minneapolis-Moline steadfastly chose as its guideposts *quality* and *dependability*. Typical of the MM products built on quality and dependable performance are MM Harvestors, the original lightweight, big-capacity combines introduced by Minneapolis-Moline as early as 1934 . . . these MM Harvestors still feature the original single-unit construction design that did so much to reduce weight and increase durability and ease of handling.

Now with Uni-Matic Power for hydraulic control of cutting height, with Powerflow Drive on the Self-Propelled model, and with many other labor-saving, grain-saving, time-saving improvements, these MM Harvestors—the long-famous 69, the G4, that is the modern version of the original Harvestor, and the very latest Self-Propelled—are still leading the parade of progress. In heavy crops, in down grain, in light stands, and in practically every kind of crop, MM Harvestors continue to prove that they can do a superior job of getting, threshing, separating, and cleaning all the crop . . . speedily and at low cost.

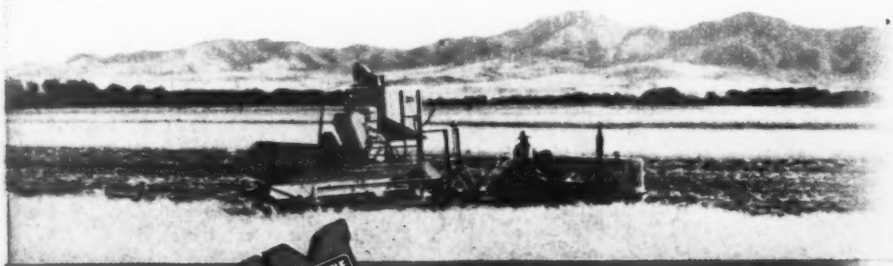


MM Harvestors are now widely acclaimed for these outstanding MM features: efficient, big-capacity, straight-through threshing and cleaning mechanism that gently and thoroughly threshes and cleans all the grain or beans without cracking them . . . the sturdily built rasp bar cylinder and the electrically welded concave and grate built for maximum strength and maximum efficiency . . . MM design and quality construction of grain pan with its fishback channels built to keep the grain from bunching in front and sides when the Harvestor is operating on rolling land . . . MM straw racks and cleaning shoes built to do a thoroughly efficient job even on rolling fields.

Harvestors have heavy-duty, structural steel single-unit frames for extra strength and durability needed under tough conditions. MM Harvestors are balanced and light in weight, yet extra sturdy for quick, easy handling, and light in draft for substantial savings in power and fuel.

These are just some of the reasons modern MM 69, 12-foot G4, and 14-foot Self-Propelled Harvestors are dependable and actually built to do the work under the most rugged conditions.

Your neighborly MM dealer can give you complete information on the Harvestors, with or without pick-ups, Windrowers, MM Tractors, Power Units, Bale-O-Matics, and other MM Machines, as well as genuine replacement parts and service.



MINNEAPOLIS MOLINE
MODERN MACHINERY

MINNEAPOLIS-MOLINE
MINNEAPOLIS 1, MINNESOTA